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AIR POLLUTION ABSTRACTS

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This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Translations are cited with their sources whenever possible. The subject fields are as follow: Emission Sources; Control Methods; Measurement Methods; Air Quality Measurements; Atmospheric Interactions; Basic Science and Technology; Effects-Human Health; Effects-Plants and Livestock; Effects-Materials; Economic Aspects; Standards and Criteria; Legal and Administrative; Social Aspects; and General and Miscellaneous. All abstracts are listed under one of the above subject fields. A subject and author index are included. This issue contains abstracts 15475 - 16349.

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AIR POLLUTION ABSTRACTS

Volume 3, No. 1 January 1972

Prepared by:

Air Pollution Technical Information Center (APTIC)
Research Triangle Park, North Carolina 27711

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INTRODUCTION

This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given.

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The serial publications (journals, periodicals, etc.) which are regularly screened for input are listed with their publishers' addresses in one issue in each volume of our abstract bulletin; the most recent list appeared in the December 1971 issue.

As another service, abstracts of all of the literature in APTIC (not just in a single issue of this periodical) on any subject related to air pollution will be provided free of charge upon request. APTIC can search information more recent than that in the current issue of this periodical because of lapse of time entailed by editorial, make-up, and printing work. More than 1400 subject index terms are available for such searching—more than those included in the subject index in each issue.

SUBJECT FIELDS AND SCOPE NOTES

1. EMISSION SOURCES

Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc.

2. CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry—e.g., automobiles.

3. MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development, testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories.

4. AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories.

5. ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere. Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions are assigned to Basic Science and Technology.

6. BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes photochemical studies in the atmosphere and biochemical studies related to effects of air pollution.

7. EFFECTS–HUMAN HEALTH

Covers medical and epedemiological studies; biological effects other than those on plants and livestock produced by air pollutants; laboratory animal experiments.

8. EFFECTS–PLANTS AND LIVESTOCK

Effects on vegetation–crops, trees, other plants–and on livestock as distinguished from laboratory experimental animals.

9. EFFECTS–MATERIALS

Deterioration, corrosion, etc., of physical materials, buildings, and structures.

10. ECONOMIC ASPECTS

Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general.

11. STANDARDS AND CRITERIA

Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality, equipment characteristics, and fuels.

12. LEGAL AND ADMINISTRATIVE

Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractural activities and program descriptions.

13. SOCIAL ASPECTS

Sociological and psychological aspects such as social attitudes, public opinion studies, public relations, and public information.

14. GENERAL AND MISCELLANEOUS

Reviews of general problems, trends and background. Documents not assignable to other categories.

ABSTRACT BULLETIN

EMISSION SOURCES

15475 APTIC NO. 33406

THE OXYGEN RESERVES OF MAN. *(Sauerstoffreserven des Menschen). Text in German. Naturw. Rundschau, 24(10):435-436, Oct. 1971. 4 refs.*

It is generally suggested that our oxygen reserves are declining. However, automobile exhaust emissions contain about 10 parts carbon dioxide to one part carbon monoxide. Even if automobiles would consume 50% of the oxygen demand in an urban area, carbon monoxide concentrations would reach the critical maximum value with oxygen values hardly dropping at all. Approximately 18% of the carbon dioxide in the atmosphere has resulted from the combustion of fossil fuels. About two/mol of atmospheric oxygen were necessary for the liberation of one mol of carbon dioxide from the fossil fuel. Only seven of every 10,000 available oxygen molecules were used. By the year 2000 only 0.2% of the available oxygen supply will have been consumed.

15476 APTIC NO. 33640

ANNUAL REPORT 1970 BY THE ORGANIZATION OF GAS AND HEAT SUPPLY COMPANIES. *(Jahresbericht 1970 des Fachverbandes der Gas- und Waermeversorgungesunternehmungen). Text in German. Gas Waerme, 25(9):157-160, Sept. 1970.*

Air pollution sources, with respect to the gas and heat supply companies, are reviewed. Home heaters, contributing up to 50%, industrial combustion processes, and vehicles were the major sources. Controls for emissions from home heaters included gas as a fuel and remote heat. Natural gas combustion is smoke-free and emits no sulfur dioxide and minimum dust and soot. Boilers with remote heat usually have highly efficient filters to retain pollutant waste gas components.

15477 APTIC NO. 33923

Esso A. G. West Germany

OIL AND THE MAINTENANCE OF CLEAN WATER AND AIR. *(Oel und die Reinhaltung von Wasser und Luft). Text in German. Study 4, 20p., 1969.*

Because the mineral oil industry has enclosed all processes, odorous emissions are rare. Excessive sulfur dioxide emission is avoided by use of low-sulfur crude oils. The heavy fuel oil has a sulfur content of only 1.5%, low compared to other countries. The concentration in the light fuel oil is only one-fourth that of the heavy oil. Desulfurization of heavy fuel oil or waste gases is not economic for Europe. High stacks, however, are an efficient method for reducing locally high SO2 concentrations. Automobile exhaust gas emissions present a problem but are still at a tolerable level, so that the industry can pursue development of reduction methods without haste. For instance, the carbon monoxide emissions at a busy intersection in downtown Paris, although very high, produce less carboxyhemoglobin in the blood of policemen exposed to these emissions for two to four hours than heavy cigarette smoking. New drives for emission free automobiles still require much research and development. Meanwhile the conventional combustion engine will be improved. The most important West Germany laws and regulations concerning air pollution are listed in an appendix.

15478 APTIC NO. 33930

IMPROVEMENTS IN THE PROCESSES FOR METAL REFINING. *(Perfectionnements aux procedes pour l affinage de metaux). Text in French. (Steel Co. of Wales, Ltd. (Great Britain)) French Pat. 1,511,820. 3p., Dec. 26, 1967. (Appl. Feb. 15, 1967, 8 claims).*

A new process for refining of metal is discussed, in particular steel produced in an open hearth furnace or a converter. A flame nurtured by oxygen currents and a carbonized liquid combustible is injected in a refining receptacle containing the liquid steel to be treated. The proportion of oxygen to the combustible, is adjusted to obtain complete combustion. The flame is located inside the receptacle so that the combustion products, and not the flame, come into contact with the molten mass. The quantity of oxygen introduced is far in excess of that necessary for effecting a complete combustion of the combustibles, in the order of 150 to 200% excess oxygen. Depending on the specific case, this excess oxygen supply may even go as high as 1000%. The liquid combustible may be a heavy fuel oil, or a coke oven tar with low sulfur content. The oxygen and combustible mixtures can be injected into the refining receptacle either through a pipe, or with a blow lance with multiple jets. In view of the high combustion temperatures generated, the process permits the use of a substantial percentage of steel scrap and chips in the charge. Ferric oxide, lime and fluorspar are added to the molten steel in the receptacle for the refining process.

15479 APTIC NO. 33933

Air Pollution Control Office, Research Triangle Park, N. C.
Air Pollution Technical Information Center

PHOTOCHEMICAL OXIDANTS AND AIR POLLUTION: AN ANNOTATED BIBLIOGRAPHY. PART II. *APCO Pub-AP-88, p. 815-1529, March 1971. 1065 refs.*

NTIS: PB 201210

The bibliography on photochemical oxidants in relation to air pollution contains 1065 references and abstracts on the effects of oxidants on plants, livestock, and materials, economic effects, air quality measurements, legal, administrative, and social factors, standards and criteria, and basic science and technology. Author, title, subject, and geographic relation indices are included.

15480 APTIC NO. 33934

Air Pollution Control Office, Research Triangle Park, N. C.,
Air Pollution Technical Information Center

PHOTOCHEMICAL OXIDANTS AND AIR POLLUTION: AN ANNOTATED BIBLIOGRAPHY. PART I. *APCO Pub-AP-88, p. 1-813, March 1971. 1680 refs.*

NTIS: PB 201210

The bibliography on photochemical oxidants in relation to air pollution contains 1680 references and abstracts on oxidants in general, emission sources, atmospheric interaction studies, measurement methods, control methods and devices, and effects on human health.

15481 *APTIC NO. 33965*

Fukuoka Prefectural Government (Japan), Public Nuisance Section

FUKUOKA PREFECTURE WHITE PAPER ON ENVIRONMENTAL HAZARDS. 1970. *(Showa 45 nendo kogai hakusho). Text in Japanese. 167p., Jan. 1971.*

The actual condition, administration, and public problems related to environmental hazards caused by air, water, and noise pollution in Fukuoka Prefecture were summarized. Industrial emissions, automobile exhaust gases, and emissions from heaters are the major sources of pollution. The condition of pollution and its control was discussed for different areas within the Prefecture. The influence of cadmium on crops and humans in the Omuta district is discussed. Farmers in Omuta received a chronic intoxication of cadmium. Metals, suspended dust, lead, sulfur oxides, oxidants, nitrogen oxides, hydrocarbons, and carbon monoxide are other important pollutants. Control methods, measurement methods, and effects on human health are mentioned. The environmental control program, legislation, advisory services, and standards are also discussed.

15482 APTIC NO. 34097

SYSTEMS STUDY OF DATA AVAILABILITY ON NATURAL GAS. *Bureau of Mines, Washington, D. C., Div. of Fossil Fuels, Air Pollution Control Office Contract A-501, 106p., June 1971. 27 refs.*

NTIS: PB 201465

The clean burning quality of natural gas, coupled with the need for improving air quality standards, necessitates greater knowledge of natural gas supplies, the capability of transmission systems, and the utilization of natural gas by various consumer sectors. Aproposal to institute a natural gas data bank which will provide such knowledge is discussed. Data sources must be credible, ongoing, provide a continuous data series, yield specialized information, and be sufficiently uniform for the program. Initially, data will be available from 13 sources. The core of the information will be furnished by the Bureau of Mines, The Federal Power Commission, and the American Gas Association. The data bank will show the dynamic phases of natural gas supplies from potential resources to proved reserves and annual production. The computerized data will indicate the manner in which foreign and domestic supplies are linked to U. S. markets and utilized within specific geographical areas such as Air Quality Control Regions. Information on prices, current and future demands, and sulfur quality will become part of the data bank. Initial cost of the data bank will be approximately $250,000 and annual maintenance costs approximately $80,000. (Author abstract modified)

15483 APTIC NO. 34283

TREATMENT OF DATA CONCERNING INTERNAL COMBUSTION ENGINES. *(Nainen kikan no data shori). Text in Japanese. Kikaiken Nyusu (Mech. Res. News), no. 10:3-4, Oct. 1971.*

Computer programming for combustion analyses of internal combustion engine data is discussed. Measurements by the analog inputs include temperatures of fuel, lubricant, cooling water, suction air, exhaust gas, ignition plug, and pressures of air, emission, and lubricant. Measurements of carbon monoxide, carbon dioxide, hydrocarbons, and nitrogen oxide by non-dispersive infrared, and nitrogen dioxide by non-dispersive ultraviolet spectrometry are included. Digital inputs include fuel consumption time, rotation speed, and torque.

15484 APTIC NO. 33649

Aguet, E.

TECHNICAL AND ECONOMICAL ADVANTAGES OF COMBINED GAS TURBINE/STEAM POWER PLANTS. *(Technische und wirtschaftliche Vorteile kombinierter Gasturbinen/Dampfkraftwerke). Text in German. Mitt. Ver. Grosskesselbetr., 51(5):402-409, Oct. 1971. (Presented at the Vereinigung der Grosskesselbetreiber-Hauptversammlung, Munich, West Germany, June 30, 1971.)*

Processes to convert the wasted energy and heat of the gas turbine into mechanical energy are examined. Gas turbine waste gases (400-500 C) are passed to a waste heat boiler and the steam produced is used for the condensation turbine. Since the waste gases from the turbine still contain 16% oxygen, they can be used as oxygen carriers for combustion in a conventional boiler. The waste energy conversion methods raise the efficiency of the power plant and reduce investment costs.

15485 APTIC NO. 33634

Altman, Manfred

THE ENVIRONMENT-ENERGY BALANCE: NEEDED ACTIONS. *Mech. Eng., 93(5):33-36, May 1971.*

Electric power generation is examined with respect to energy source, converter, storer, transmission, distribution, economics, ecology, social impact, climatology, legal aspects, and industry-government relations. The problems of waste heat discharge and carbon dioxide emissions are discussed. Proposed solutions to the problems are presented.

15486 APTIC NO. 33931

Amero, R. C.

FUELS FOR TRANSPORTATION. *Preprint, American Society of Mechanical Engineers, New York, Fuels Div.; Inst. of Fuel, London (England); Inst. of Combustion and Fuel Technology of Canada, Ottawa (Ontario), 8.1-8.28, 1970. 38 refs. (Presented at the North American Fuel Technology Conference, Ottawa, Ontario, May 31- June 3, 1970, Paper ASME-NAFTC-3.)*

Liquid hydrocarbon fuels supply energy for almost all of the world s transportation. The principal exception is natural gas used to power compressor stations on pipelines, if gas transmission is considered a sector of transportation. For 50 years, refinery development has meant increased yield and octane rating of gasoline. Demand for distillate (jet, diesel, and marine gas turbine fuel), though smaller, is now growing faster. Refiners have great technical versatility for converting widely different crudes into specification fuels. The technology has been extended to produce the same kinds of fuels from tar sands. Technology now being developed should be available when needed to convert shale oil and coal into conventional fuels. Air pollution controls and new engines may alter the distribution of products from the petroleum barrel, but electric automobiles, nuclear ships and other non-hydrocarbon systems are not expected to supply a large share of transportation in the foreseeable future. Fuel consumption is discussed for trucks, buses, automobiles, trains, aircraft, and ships. (Author abstract).

15487 APTIC NO. 34217

Andon, Jerar and I. R. Barpal

EMISSION OPTIMIZATION OF HEAT ENGINE/ELECTRIC VEHICLE. (FINAL REPORT). *Minicars, Inc., Goleta, Calif., Air Pollution Control Office Contract EH S-70-107, Proj. EHS-70-107, Minicars Proj. 1010, 101p., Jan. 28, 1971. 7 refs.*

NTIS: PB 198093

A study was made of the relative reduction in exhaust emissions obtainable from a prototype heat engine/electric hybrid vehicle compared to the same vehicle powered by the heat engine alone. The vehicle was tested in its original design state, with improvements in the power train, and with changes in the air/fuel ratio of intake air. Complete emission data for the three phases of testing are tabulated. Hybrid operation markedly reduced hydrocarbon and carbon monoxide emissions. Delayed throttle control, increased electrical power, and a heated manifold that allowed the use of leaner air/fuel mixtures resulted in a further reduction. The best emission reductions were approximately 60% reduction in hydrocarbons and carbon monoxide and 25% reduction in nitrogen oxides when comparing the baseline heat engine with hybrid power trains.

15488 APTIC NO. 33336

Auchapt, Jacqueline-Marguerite

PROPERTIES AND RECENT APPLICATIONS OF THE NITROGEN OXIDES NO AND NO2 (LITERATURE SURVEY FROM 1950 TO 1968). *(Proprietes et applications recentes des oxydes d azote NO et NO2 (etude bibliographique de 1950 to 1968). Text in French. Commissariat at l Energie Atomique, Marcoule (France), Centre de Production de Plutonium, CEA-BIB-172, Dec. 1969. 70p. 278 refs.*

An extensive literature on the properties and uses of nitric oxide and nitrogen dioxide is reviewed, considering the gases as they occur in nature, as by-products of various human activities, and as raw materials for industry. The latter category includes methods of enriching various fuels, particularly those containing zirconium; the Darex procedure for dissolving the combustion-supporting elements in certain steel alloys such as inox steel; uses with various radioactive elements (uranium, thorium, plutonium, ruthenium); propellant applications (combined with propane, hydrazine, polyethylene), in organic synthesis; and for surface modifications of metals such as inox steel (polishing and the prevention of corrosion).

15489 APTIC NO. 33508

Babina, M. D.

DETERMINATION OF VOLATILE SUBSTANCES EMITTED INTO THE AIR BY SHOE INDUSTRY PLANTS. *(Opredeleniye letuchikh veshchestv, vydelyayushchikhsya v vozdukh predpriyatiy obuvnoy promyshlennosti). Text in Russian. In: Nov. Obl. Prom.-Sanit. Khim. 1969. S. I. Muraveva (ed), 1969, p. 227-232.*

Glues commonly used in the shoe industry were analyzed for volatile substances released on the heating. When the glues based on chloroprene rubber are used, the atmosphere has to be analyzed for chloroprene, ethylacetate, and ammonia. The basic volatile components of divinylstyrene latexes are styrene and ammonia. When thermoplastic materials based on synthetic resins (polychlorovinyl and polyamid) are used, a complex mixture of volatile decomposition products is released into the atmosphere. A simplified colorimetric method of chloroprene analysis by diazo-p-nitroanilin was elaborated. The effect of benzene, ethylacetate, ammonia, and gasoline on chloroprene determination was clarified. Only ammonia in one-two mg concentrations hinders the determination. It can be removed by absorption in .01 N sulfuric acid solution or in distilled water.

15490 APTIC NO. 33626

Bailey, Bruce S.

GASOLINE-MOTOR ENGINEERING. *J. Wash. Acad. Sci., 61(2):74-84, 1971. 4 refs.*

A maximum efficiency obtainable by a gasoline engine is limited, among other things, by the octane number of the available fuel. Lead has been instrumental in making possible today s high octane gasolines, and the removal of lead from gasoline will produce direct and indirect octane losses that will force substantial reductions in engine efficiency. A review of pure hydrocarbon octane data indicates that: the octane potential of unleaded gasolines is not as high as present leaded gasolines; good motor octane performance will be particularly difficult to achieve in unleaded gasolines; and high octane unleaded gasolines will require high concentrations of aromatics. The two real problems resulting from the use of lead are increased exhaust-system corrosion and decreased spark-plug life. Both problems can be minimized through use of high-quality gasolines and engine oils and proper maintenance procedures. No ready solution exists for the problems, particularly valve recession, that occur when engines are operated under heavy duty conditions on unleaded gasolines. Future use of lead antiknocks should not be foreclosed until it is clear that a clean engine cannot be developed which uses leaded fuels. (Author abstract modified)

15491 APTIC NO. 33390

Bando, K., S. Daido, and Y. Hamamoto

INCOMPLETE COMBUSTION OF HYDROCARBONS IN QUANTITATIVE TESTS. *(Teiseki nensho ni okeru minensho tanka suiso). Text in Japanese. Preprint, the Society of Automotive Engineers of Japan, Inc., Tokyo, p. 77-87, May 1971. (Presented at the Society of Automotive Engineers of Japan, Academic Conference, Tokyo, Japan, May 1971.) 4 refs.*

Carbon monoxide and hydrocarbon concentrations in various cylindrical combustion vessels were measured, as vessels surface-volume ratios (S/V), air-fuel mixture ratios (A/F) and the initial pressures (P) were changed. Gases were analyzed by gas chromatography, inorganic gases were analyzed by a thermal conductivity detector, and hydrocarbons were measured by a hydrogen flame ionization detector. First, HC concentrations at various S/V ratios, A/F ratios, and P were calculated. According to the calculations, the minimum HC concentration was obtained at approximately A/F equals 1.1, but in actual measurement, the minimum value was obtained at A/F equals 0.85. The HC and S/V ratio did not form a linear relationship, but rather a curve. The HC concentration decreased with the increase in pressure, though not to the extent of Friedman s calculation based on quenching distances. The ratio of carbon monoxide weight concentration and carbon dioxide weight concentration (g(CO)/g(CO2)) increased with the rise of S/V ratio, and a linear relationship was formed between g(CO)/g(CO2) and quenching speed. Gases near the walls of cylinders were extracted by an electro-magnet sampling valve in order to evaluate the influence of flame quenching speed on combustion. Incomplete combustion of HC near the wall was due to fast quenching of flames.

15492 APTIC NO. 33645

Barber, S. T.

UNIQUE CHANCE FOR GAS WITH MAKE-UP AIR HEATING. *Gas. J., 347(5626):225-226, Sept. 15, 1971.*

Make-up air heating is the process of raising the temperature of incoming outside air required to replace that exhausted by ventilating systems to the desired level of comfort for human occupancy. Unlike space heat, make-up air passes just once through the work area and can be safely and economically heated directly by gas in the air stream. If the make-up air system is properly designed, whole areas can be efficiently covered and pockets of stale or contaminated air not previously removed by the extract system will be eliminated. Large built-in central systems and small packaged air heaters are available for make-up purposes along with directly compensating systems, e.g., spray booths, and warm air curtains. Among the advantages of gas for make-up heat application are the availability of gas burners with up to 25:1 turndown and the flexibility of gas-burner arrangements.

15493 APTIC NO. 34300

Bernadou, M. M.

AIR POLLUTION. *(La pollution atmospherique). Text in French. Bordeaux Med. (Bordeaux), 4(7/8):2057-2062,2065-2066, July/Aug. 1971. 9 refs.*

The problem of air pollution is reviewed. Toxic gases and vapors included sulfur dioxide, carbon monoxide, carbon gas, nitrogen oxides, volatile fluorides, hydrofluoric acid, chlorides, and hydrochloric acid. Dust, smoke, soot, and their hydrocarbon constituents, fog, and acidic and oxidant smogs were examined. The clinical effects of the pollutants included eye irritation, respiratory diseases, including chronic bronchitis and asthma, bone lesions, and lung cancer. Toxic levels of pollution are examined, and control measures enacted in France are reviewed. Meteorology is also mentioned.

15494 APTIC NO. 34018

Bernhart, A. P.

NOTES ON AIR POLLUTION: THE INGREDIENTS DEFINED. PART I. *Water Pollution Control (Toronto), 109(10):41-42, Oct. 1971. 19 refs.*

The problem of air pollution in Canada is reviewed with respect to effects on human health (respiratory diseases), animals, plants, buildings (soiling and deterioration), traffic (visibility), and economy; breakdown by individual pollutant; and major sources. The major pollutants and their sources included suspended particulates and dust fall from furnaces, incineration, and cement plants; pollen from grasses and trees; sulfur oxides from coal furnaces; carbon monoxide from cars; hydrocarbons from engine exhausts and gasoline evaporation; aldehydes from diesel exhausts and dry cleaners; nitrogen oxides from power plants; oxidants; odors from slaughterhouses, garment factories, glue factories, and diesel buses; fluorides from aluminum and fertilizer plants; lead from car exhausts; benzopyrene; carbon dioxide; and other minor pollutants, i.e., organic acids, hydrogen sulfide, ammonia, chlorine, and bromine.

15495 APTIC NO. 33937

Bolotova, M. N., Ya. S. Davydov, and N. G. Nikishina

BASIC INDUSTRIAL SOURCES OF THE CARCINOGENIC HYDROCARBON - BENZO(A)PYRENE. *(K voprosu ob osnovnykh promyshlennykh istochnikakh kantserogennogo uglevbodoroda -- benz(a)pirena). Text in Russian. Med. Zh. Uzbekistana, no. 11:51-54, 1967. 5 refs.*

Plants processing thermally combustible raw materials were investigated for the presence of benzopyrene. Air in the pitch-boiling plant of a cardboard factory contained 120.3 gamma/100 cu m of benzopyrene; values were 24.8 on the premises, 12.9 at a distance of 100 m from the plant, and 4.7 at 500 m. Eighty gamma/100 cu m benzopyrene was found in air in the crushing plant of a carborundum works and 57.0 in the coke furnaces. At 500 m to the south of the furnaces, the value was 12.4. The chief source of the benzopyrene was incomplete combustion of carbon materials; no benzopyrene was detected in the final products. Smoke from the two plants were the main sources of air pollution by carcinogens in Tashkent. The vinylite plant of a phonograph record factory had a high concentration of benzopyrene (mean value, 516.0 gamma/100 cu m, despite the installation of electric filters. Concentrations at rubber product factories were 4.7-1.58 gamma/100 cu m, depending on the distance from the plants. No benzopyrene was detected at an asphalt plant or in plant wastes.

15496 APTIC NO. 33804

Boyle, G. M.

THE EXPLOSION HAZARDS OF ESPARTO AND CREPE OR TISSUE DUSTS. *Paper Technol., 12(2):153-164, April 1971. 12 refs.*

The processing of esparto grass as a paper making raw material in developing countries is discussed and, to help in assessing the very dangers from dust explosions, reference is made to an explosion experienced in a Scottish mill during the last decade. Tissue or creped paper dusts have been shown to initiate an explosion which will chain react with considerable violence. When the results of these tests are related to the actual conditions viewed at some modern tissue mills, the secondary dust explosion potentials appear very real and under certain conditions could be near catastrophic. (Author summary modified)

15497 APTIC NO. 34023

Brief, Richard S., Jack W. Blanchard, Robert A. Scala, and Jerome H. Blacker

METAL CARBONYLS IN THE PETROLEUM INDUSTRY. *Arch. Environ. Health, 23(5):373-384, Nov. 1971. 29 refs.*

Metal carbonyl formation through reaction of carbon monoxide with free materials under certain conditions of temperature and pressure in the petroleum industry is reviewed with respect to operating conditions, toxicity and hazard of metal carbonyls, exposure limits, personnel protection, and recommended analytical methods for the determination of metal carbonyls. Utilizing the chemical reaction thermodynamics of metal carbonyls, nomographs were constructed for the equilibrium formation of nickel, cobalt, and iron carbonyls. Acute exposures to low concentrations of metal carbonyls produced acute pulmonary distress as a characteristic response; chronic exposures to nickel carbonyl were associated with carcinogenic activity. For evaluation of potential exposure to Ni(CO)4, urinary monitoring was effective. Wet chemical methods (colorimetry and spectrophotometry) were recommended for the analysis of Ni(CO)4. Colorimetric methods were also used for the determination of cobalt hydrocarbonyl and iron pentacarbonyl.

15498 APTIC NO. 33499

Cairns, E. J., M. L. Kyle, V. A. Maroni, H. Shimotake, R. K. Steunenberg, and A. D. Tevebaugh

DEVELOPMENT OF HIGH ENERGY BATTERIES FOR ELECTRIC VEHICLES. *Argonne National Lab., Ill., Chemical Engineering Div., 54p. July 1970. 32 refs.*

NTIS: PB 197576

The performance characteristics of lithium/chalcogen cells were investigated to evaluate their applicability as secondary (electrically rechargeable) batteries for vehicular propulsion. Several different cell configurations were examined at temperatures from 325 to 400 C. Small-scale liquid and paste electrolyte cells were operated to determine those conditons under which the cells will deliver current densities of 0.3 to 1 A/sq cm for a large fraction of their capacity densities. Liquid-electrolyte lithium/sulfur cells exhibited densities from 0.1 to 0.2 A-hr/sq cm at a current density of 0.5 A/sq cm. Sulfur utilization was under 35%. Cell performance was limited by the low diffusion rate of the cell reaction products away from the sulfur-electrolyte interface and the low electronic conductivity of sulfur. Variables which promised to increase cell performance were studied. The effects of cell operating temperatures, additives to reduce the viscosity of sulfur, cathode current-collector structure and design, and alternative cathode materials were measured. Cathode current collector structure significantly affected cell performance. A modification of the cell design to provide an increased sulfur-electrolyte interfacial area by means of a laminated cathode structure increased cell performance, producing capacity densities near 0.5 A-hr/sq sm at a current density of 0.5 A/sq cm. Corrosion tests of potential materials for construction of lithium/sulfur cells were conducted on a variety of metals, including some representative austenitic and ferritic stainless steels, manganese-chromium stainless steels, nickel-base alloys, and pure elements. Of the materials subjected to 600-hour corrosion tests at 375 C, only molybdenum, chromium, and niobium showed corrosion rates sufficiently low for use in cells of anticipated lifetimes greater than 1000 hours. (Author summary modified)

15499 APTIC NO. 33682

Candeli, A., V. Mastrandrea, and G. Morozzi

POLYCYCLIC AROMATIC HYDROCARBONS AND EXHAUST GAS OF THE INTERNAL COMBUSTION ENGINE FED DIFFERENT KINDS OF COMMERCIAL GASOLINES. *(Idrocarburi aromatici policiclici nei gas di scarico di un motore a combustione interna alimentato con* *diverse benzine del commercio). Text in Italian. Riv. Ital. Igiene (Pisa), 29-30(3/4):191-204, May-Aug 1970. 17 refs.*

A simulated internal combustion engine was fed three different kinds of commercial gasolines. The polycyclic aromatic hydrocarbons in the exhaust gases were qualitatively the same. Quantitatively, one fuel contained more polycyclic aromatic hydrocarbons than the other two. The amount of benzo(3-4)pyrene in the exhaust gases was determined. The ratios calculated for pyrene-benzo(3-4)pyrene, benzo(3-4)pyrene-1-12, benzoperylene, and benzo(3-4)pyrene-coronene were characteristic of automotive pollutants.

15500 APTIC NO. 33378

Cheklich, George E.

U. S. ARMY S HYBRID COMBUSTION ENGINE AND THE 1975 FEDERAL EXHAUST EMISSION STANDARDS. *J. Wash. Acad. Sci., 61(2):85-90, 1971.*

Two processes utilizing the stratified charge principle (a form of hybrid combustion) are under investigation: The Texaco Combustion Process (TCP) and the Ford Combustion Process (FCP). Only a small amount of fuel reaches the combustion chamber walls in a stratified charge engine, leading to reduced quenching and thereby minimizing unburned hydrocarbons. Very lean air-fuel ratios minimize formation of carbon monoxide and nitrogen oxides. With a FCP hybrid combustion engine and a catalytic reactor, the highest production army vehicle (the M-151 jeep) surpasses the 1975 Federal emission standards. Even without the catalyst, the FPC engine easily meets the 1972 standards. Currently, the TPC system approaches the 1972 standards without a catalyst and the 1975 standards with a catalyst. However, expected significant improvements in emissions should make TCP performance comparable to the FCP. Major advantages of the TCP are its capability to be turbocharged and the fact that it is not octane or cetane limited. The use of low-octane lead-free fuels is possible. Exhaust emission data for both systems are tabulated.

15501 APTIC NO. 33979

Clarke, A. J., D. H. Lucas, and F. F. Ross

TALL STACKS -- HOW EFFECTIVE ARE THEY? Clean Air, 1(2):18-27, Summer 1971. 23 refs. (Presented at the International Clean Air Congress, 2nd, Washington, D. C., Dec. 8, 1970.)

The efficiency of tall stacks as a control method for stack gas emissions is investigated with respect to reduction of total pollution, areas affected, correlation with distances, acid rain, special weather conditons, topographical factors, high sulfur fuels, air navigation, and appearance. Computations for total pollution for a particular source and wind speed plotted against effective chimney height determined that total pollution will always be reduced by increasing chimney height. Tall stacks do not spread pollution: a source with no chimney produced a certain pattern of ground level pollution with very high concentrations near the source and decreasing concentrations at greater distances; with chimneys, the very high concentrations became zero and the concentrations in the middle region decreased. Diffusion models were presented and plume dispersion was determined. Meteorological considerations included lapse rates, low level inversions, and elevated inversion layers. Plume behavior under specified conditions, e.g., looping, fumigation, and buoyancy, was determined. Acceptable levels of sulfur dioxide emissions and measures to supplement stack efficiency are discussed.

15502 APTIC NO. 33491

Deacon, W.

A SURVEY OF THE CURRENT STATE OF THE ART IN GAS TURBINE COMBUSTION CHAMBER DESIGN. *Proc. Inst. Mech. Engrs. London, 183(3N):20-27, 1968-1969. 20 refs. (Presented at the Institute of Mechanical Engineers, Technical Advances in Gas Turbine Design Symposium, Coventry, England, April 9-11, 1969.)*

The essential requirements of a combustion system are considered and the current state of the art in gas turbine combustion chamber design is reviewed. Whether combustion volumes have decreased since the early days, what scope remains for further reduction, and the length of the combustion volume are considered. Having assessed the critical burning volume the designer has to fit a recirculation pattern within it. Although data from dilution mixing rigs provide useful rules regarding the mixing length required for a given overall temperature distribution, a disturbing feature is the large amount of combustion chamber development still necessary to give the required radial profile of temperature. The pressure drop of most interest to the engine designer is that between compressor outlet and turbine inlet. The fuel spray is complementary to the air recirculation pattern and both must be adequate to cope with the task of starting the turbine under arduous conditions. Ignition, flame tube cooling, exhaust smoke, and interplay among the variables within a combustion chamber are also discussed. With current knowledge, it is now possible to define the minimum size of combustion chamber for any application, its likely pressure loss, metal temperature, and magnitude of hot spots in the outlet temperature. However, in new designs, the attainment of the required radial profile of outlet temperature frequently means prolonged rig development.

15503 APTIC NO. 34068

Djuric, Dusan, Zarka Kerin, Ljubica Graovac Leposavic, Ljiljana Novak, and Marija Kop

ENVIRONMENTAL CONTAMINATION BY LEAD FROM A MINE AND SMELTER. *Arch. Environ. Health, vol. 23:275-279, Oct. 1971. 1 ref. (Presented at the Conference on Inorganic Lead, Amsterdam, Netherlands, Nov. 28, 1968.)*

The contamination of a large area in Yugoslavia by lead from a mine and smelter is illustrated in a preliminary report by fragmentary data obtained by the determination of lead in the surrounding air, in the water of a river draining the area, in the soil, and in local vegetation. A screening test (determination of the urinary excretion of delta-aminolevulinic acid) applied to groups in the population suggests that the absorption of lead by members of the groups may be hazardous. (Author abstract)

15504 APTIC NO. 33771

Eisfeld, Fritz

THE PROBLEMS OF SMOKE AND OF EXHAUST GAS EMISSION IN TURBINE ENGINES. *(Probleme des Rauchens und der Abgasemission von Turbinentriebwerken). Text in German. D.F.V.L.R. - Nachr. (Deut. Forsch. - Versuch anst. Luft-Raumfahrt), 3(5):117-180, Aug. 1971.*

The tendency of turbine engines to generate smoke increases with increasing temperature and pressure. The trend towards higher compression engines and towards higher combustion chamber temperatures in airplane turbine engines makes these engines resemble diesel engines. Smoking is caused by deficiency of air and by heating too fast, which induces cracking and produces reaction products conducive to soot formation. Since most soot forms in the primary zone near the nozzle, if air is blown into this space, soot formation is reduced. However, this aggravates the emission of nitrogen oxides. While the emission of carbon monoxide and particulates was reduced by 23%, that of nitrogen oxides was increased by 40%. Therefore, other solution are being sought, similar to those tried on diesel engines. Thus, fuel can be injected by compressed air, resulting in smokeless combustion. Another approach is to feed the fuel in the form of a film on the combustion chamber wall where it evaporates. Current and projected (1976) emissions of CO, hydrocarbons, and nitrogen oxides from jet engines are reviewed and evaluated by the California emission standards.

15505 APTIC NO. 34228

Engdahl, Richard B.

ON-SITE INCINERATION OF SPECIAL INDUSTRIAL WASTES. *In: Principles and Practices of Incineration. Richard C. Corey (ed.), New York, Wiley-Interscience, 1969, Chapt. 7, p. 210-226. 32 refs.*

As a means of controlling air pollution, on-site incineration of special industrial wastes is often advantageous. The worthless, solid, combustible residues from manufacturing processes can be disposed of by the Class III incinerator. Skillful operation is necessary, however, to avoid the discharge of fly ash and smoke. Refractory-lined rotary kilns are also used to burn industrial solid wastes. Conical burners and silo burners have been used to dispose of wood wastes. The silo burner is preferred, since the conical burner tends to emit dusts, cinders, and fly ash. Special incinerators have been developed for burning scrap automobiles. Afterburners are often required to completely burn the combustible gases as they enter the incinerator chimney. Dust collecting systems are required with most methods of solid waste disposal. The incineration of liquid wastes is also discussed in detail. Some effluents contain combustible hydrocarbons; they can be incinerated by direct flame of may be catalytically oxidized. The incineration of gaseous wastes must be complete or products of partial oxidation, such as aldehydes or organic acids, may be discharged. Cost of data are given for direct-flame incineration in several cases of industrial odor and fume problems, and for odor control by catalytic combustion and direct-flame afterburning.

15506 APTIC NO. 33641

Eshleman, Alan, Sanford M. Siegel, and Barbara Z. Siegel

IS MERCURY FROM HAWAIIAN VOLCANOES A NATURAL SOURCE OF POLLUTION? Nature (London), 233(5320):471-472, Oct. 15, 1971. 7 refs.

Field air samples were collected and analyzed to determine whether active volcanism on the island of Hawaii is producing significant amounts of mercury. A Utopia Instruments flameless mercury analysis kit and a 10 cm absorption cell mounted on the burner of a Beckman 1301 atomic absorption spectrophotometer were used to analyze the mercury contents of the trapped sample. Significant amounts of mercury were produced from volcanoes, with 98% of the mercury issuing from the Hawaiian fumaroles either in the form of a gas or as particles less then 0.3 micrometer in diameter.

15507 APTIC NO. 33936

Foure, C.

FORMATION OF CARBON DEPOSITS IN CHAMBERS OF AIRCRAFT TURBO-ENGINES. *(Formation et depot de carbone dans les foyers de turbo-machines d aviation). Text in French. Advisory Group for Aeronautical Research and Development, Paris (France), Combustion Researches and Reviews, 1955, no. 9:125-139, 1955. 13 refs. Presented at the AGARD Combustion Panel Meetings, 6th and 7th, Schevenigen, The Netherlands, May 1954 and Paris, France, Nov. 1954.)*

NTIS, DDC: AD 688925

Carbon formation in the flame of turbo-engines usually has no effect on thermal output but coke deposits on walls have a deleterious effect on aerodynamic characteristics by creating thermal gradients causing a deformation of the flame, by causing fissures in the refractory lining, and by contributing to a deterioration of the turbine. The location, aspects, and nature of the deposits, the effect of fuel characteristics on carbon deposits, the structure of the carbon particles, the quantity and size of carbon particles in the flame, and the means available for a reduction of carbon deposits including suppression of carbon formation in the flame and the elimination of the impact of carbon formation on the engine wall are discussed. Currently used turbo-engines using prescribed fuels are not seriously hampered by the formation of carbon deposits. But the development of high compression engines and the use of inferior fuels could change the situation. The role various fuel characteristics play in the formation of carbon deposits is understood but no fuel additive that would reduce carbon deposits is as yet known. Modifications in the construction of combustion chambers which would result in a reduction of carbon formation in the flame or protect the walls against such deposits are possible.

15508 APTIC NO. 33950

Garvey, James R.

THE PROBLEM OF SULFUR IN FUELS. *Preprint, American Society of Mechanical Engineers, New York, Fuels Div.; Inst. of Fuel, London (England); Inst. of Combustion and Fuel Technology of Canada, Ottawa (Ontario), p. 21.1-21.12, 1970. 16 refs. (Presented at the North American Fuel Technology Conference, Ottawa, Ontario, May 31-June 3, 1970, Paper ASME NAFTC-6.)*

According to surveys conducted by the National Center for Air Pollution Control, the combustion of coal and petroleum products accounts for 78% of the sulfur dioxide emitted to the atmosphere of the United States. The use of coal and oil for electric power generation accounts for most of the emissions. There does not appear to be any evidence of slow-down in the growth of power generating capacity (the Federal Power Commission has just revised their estimate for 1980, increasing it by 16% over the estimate in their 1964 report). High sulfur coal is the only indigenous fuel in the United States which is available in sufficient quantity to meet the growing electric demand. Since it is apparent that these fuels must be used, the development and application of control techniques must be accelerated if we are to even maintain sulfur oxide emissions at the current level. (Author abstract)

15509 APTIC NO. 34180

Gerhold, Henry D. and Gordon H. Plank

MONOTERPENE VARIATIONS IN VAPORS FROM WHITE PINES AND HYBRIDS. *Phytochemistry, vol. 9:1393-1398, July 1970. 18 refs.*

Possibilities of altering the monoterpene composition of vapors given off by white pine twigs, bark, and internal tissues by means of hybridization were investigated by gas chromatographic analysis of fifty-four trees. Fourteen peaks were detected in the chromatograms. These are designated heptane, alpha-pinene, beta-pinene, limonene, and unknowns F, G, H, J, L, and N. J is probably undecane and/or camphene, and L is probably myrcene and/or 3-carene, on the basis of relative retention times compared to those in the literature. F may be octane, and G may be nonane. Peaks A, B, and C were caused by small amounts of contaminants from the container in which branch segments were warmed. Considerable variation in the chemical composition of vapors was found among the hybrids produced by crossing Pinus strobus with P. griffithii, P. koraiensis, P. flexilis, and P. ayacahuite. The intraspecific variation of P. strobus was nearly as large, however. Vapors from needles and bark closely resembled those given off by internal tissues, but exceptions were noted for several compounds. (Author abstract modified)

15510 APTIC NO. 33666

Grimbergen, M. van, G. Reybrouck, and H. van de Voorde

THE DEVELOPMENT OF IMPURITIES IN THE AIR FROM BURNING THERMOPLASTICS. *(Das Entsehen von Luftverunreinigungen bei Verbrennung thermoplastischer Kunstoffe). Text in German Zentralbl. Bakteriol., Parasitenk. Infektionskr. Hyg: Abt. 1: Orig., Reihe B, vol. 155:123-130, 1971. 20 refs.*

Plastics used for disposable containers were burned in an electric oven to determine gaseous and solid impurities in their combustion products. Pure polyethylene and polystyrene burned completely at 300-400 C with excess air. Pure polypropylene and polyvinyl pyridine injection syringes gradually disintegrated at 200-400 C. During the burning of PE and PP, large amounts of soot and tar products formed. Pure polyvinylchloride burned without an ash residue at about 650 C, but the PVC tests always gave an ash residue of about 4.5% at this temperature. Gases from burning PE, PP, PS, and PVC produced a strongly acid pH pattern in water. With the exception of considerable concentrations of aliphatic aldehyde, waste gases from PE and PP are not sources of impurities in air. A large amount of styrene is formed during the burning of polystyrene. Thermal destruction of polyvinylchloride is always associated with formation of hydrogen chloride, regardless of temperature. (Author abstract modified)

15511 APTIC NO. 33494

Gronhovd, G. H., Arnold E. Harak, and L. E. Paulson

ASH FOULING STUDIES OF NORTH DAKOTA LIGNITE. *Bureau of Mines Information Circular, no. 8376:76-94, May 1968. 5 refs. (Presented at Bureau of Mines - North Dakota University Symposium on Technology and Use of Lignite, Grand Forks, N. Dak., April 27-28, 1967.)*

The possible correlation of the sodium content of a particular North Dakota lignite with ash fouling problems in an electric utility boiler was investigated by full-scale testing at extreme and intermediate sodium levels. The fouling tendencies of the various coals were evaluated by direct observation of boiler performance (particularly exit gas temperatures, draft losses, and visual observations of deposit formation), by determination of the rate of deposit buildup on an air-cooled probe at various superheater and reheater sites, and by dust loading measurements to determine ash deposit quantities. Results showed that the degree of fouling was directly related to the sodium content of the lignite, and the resultant program to coordinate load and sodium content for the boiler considerably improved plant operation. Results from washing lignite with various ion-exchange solutions as part of a study to find methods for removing the sodium, showed that sodium is the easiest metal in the ash to replace. Early results of further tests to study the interaction of calcium and sodium in ash deposition indicated no benefit and probably a penalty for high calcium content. A description is included of a small pulverized coal furnace now under construction for pilot plant scale laboratory studies of ash fouling, air pollution, and other lignite combustion problems.

15512 APTIC NO. 33736

Gruemm, Hans

ENVIRONMENT AND POWER GENERATION. *(Umwelt und Energieerzeugung). Text in German. Umwelt (Duesseldorf), 1(5):14-18, Oct./Nov. 1971. 14 refs. (Presented at the Reaktortagung, Bonn, West Germany, March 30-April 2, 1971.)*

Power generation by combustion will prevail in the near future, despite of the advances of nuclear power. During the combustion process pollutants such as the oxides of sulfur, nitrogen, and carbon, hydrocarbons, and dust particles are emitted into the atmosphere. Over the past 100 years, about 200 billion tons of carbon dioxide have been liberated by the combustion of fossil fuels. The CO2 level in the atmosphere rises presently by about seven ppm per decade. In the year 2000 five times the natural CO2 concentration can be expected in the atmosphere. The combustion processes interfere with the oxygen content of the atmosphere. Moreover, it is expected that the industrial sulfur dioxide emission will exceed the natural SO2 production by the year 2000. The oxides of nitrogen produced in the combustion processes are strong absorbers of ultraviolet radiation. A solution seems to be near for waste heat. There seem to be many fields for its use--for remote heating, frost protection, and heating of greenhouses.

15513 APTIC NO. 33483

Guillermic, A. F.

SMOKE CIRCULATION IN DOMESTIC HEATING INSTALLATIONS HEATED BY FUEL OIL (NATURAL FLUE DRAUGHT). *(Le circuit des fumees dans les installations de chauffage domestique alimentees au fuel-oil (tirage naturel). Text in French. Chaleur et Climats Waterloo), no. 400:53-83, April 1969.*

The displacement of a volume of combustion gases from the point of emission to the point of diffusion into the atmosphere, including the circulation of the gases in the furnace, in the stove pipes, and in the interior of the chimney, were studied. For reasons of safety domestic furnaces must always operate under reduced pressure induced by a natural draught which requires only a relative air tightness of the system to avoid the leakage of poisonous gases into the heated premises. A draught regulator should form part of all heating systems. In the calculation of chimneys the caloric output of the furnace, the possible height of the chimney, the pressure gradient between the interior the chimney and the exterior atmosphere, the nature of the chimney walls, and environmental temperatures must be considered. Calculations of smoke circulation under different conditions disclosed that the quality of a smoke circuit is characterized by the degree of air-tightness, the conductivity and roughness of the flue walls, the pyrometric resistance and resistance to corrosion by components of the combustion gas, and by their resistance to thermal shocks resulting from sudden variations of the combustion gas temperature. The improvement of existing chimneys and the use of hollow and honeycombed prefabricated building elements and double-walled flues are described and smoke circulation under varying operating conditions is analyzed. Pollution from domestic heating systems is evaluated.

15514 APTIC NO. 33404

Hague, Brian C.

NEW FERTILIZER PLANTS IN SAUDI ARABIA AND KUWAIT TO REDUCE GAS WASTES. *World Petrol., 41(7):28-32, July 1970.*

The fertilizer plants constructed in Saudi Arabia and Kuwait are reviewed. The ammonia and urea plant in Saudi Arabia has a capacity of 600 tons/day of anhydrous ammonia providing feed for a urea facility of 1025 metric tons/day, with 55 tons/day of sulfur recovered as a by-product. The fertilizer plant in Kuwait has a capacity of 400 metric tons/day liquid ammonia, 550 metric tons/day urea, 500 metric tons/day ammonium sulfate, and 400 metric tons/day sulfuric acid. The petrochemical plants were motivated by the need to use the natural gas flared off at oilfield plants; over 7000 mmcf/day of natural gas was produced in the Gulf area in 1969. A short background of the petrochemical industry on the Gulf area is presented. Plans for more plants in Saudi Arabia, with respect to the companies involved, construction plans, locations, transport of ammonia, and projected capacity and output, are reviewed. The petrochemical process and specially designed stamicarbon urea units are described.

15515 APTIC NO. 33428

Hanslian, Lubomir and Karel Kadiec

PRODUCTS OF THERMAL DISINTEGRATION OF WOOD. *(Prudukty tepelneho rozkladu dreva). Text in Czech. Praconvni Lekar. (Prague), 16(7):331-336, 1964. 21 refs.*

Based on data reported in the literature, problems of pyrolysis of wood and its most important products from a medical point of view, particularly the tar fraction, are discussed. Greatest attention is paid to the tar fraction. While 0.9 to 3.7% 3,4-benzpyrene was found in black coal tars and 0.003 to 0.009% in brown coal tars, no benzpyrene was detected in tars from wood. However, it is possible that under similar conditions of processing, i.e., at high temperatures, polycyclic carcinogenic hydrocarbons may also be formed from timber.

15516 APTIC NO. 34160

Heinen, Charles M.

STATE OF KNOWLEDGE AND TECHNICAL DIRECTIONS OF SOLUTION. *George Washington Univ., Washington, D. C., PTC Research Inst., Conf. Air Water Depollution: Roles Ind. Prop., Innovation and Competition, Washington, D. C., 1970, p. 8-20. (March 31.)*

The feasibility of proposed 1975 emissions standards for automobiles (carbon monoxide, 11.0 g/mi; hydrocarbons, 0.5 g/mi; nitrogen oxides, 0.9 g/mi; and particulates, 0.1 g/mi) are evaluated. A device to control crankcase fumes and an evaporative control system are depicted; mainfold reactors and catalytic control are also considered. Automotive emission control costs are cited.

15517 APTIC NO. 33735

Hellwig, A. and D. Hempel

STUDIES OF THE RELATIONSHIP BETWEEN THE EMISSION OF FLUORINE COMPOUNDS AND THEIR CONCENTRATION IN ATMOSPHERIC AIR AND WATER. *(Untersuchungen ueber den Zusammenhang zwischen der Emission von Fluorverbindungen und ihrem Gehalt in der atmosphaerischen Luft und im Wasser). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 17(9):651-655, Sept. 1971. 20 refs.*

Fluoride compounds are frequently components of industrial emissions. Hydrogen fluoride is emitted in the manufacturing of bricks and clay. The most important source for fluorine-containing emissions is the chemical industry. Fluorine is a natural component of human and animal tissue. Man needs a daily dose of 1.5 to 1.8 mg fluorine which is supplied by the water (0.1 mg) and by food (0.4 mg). In the vicinity of a superphosphate plant, the fluorine content of the atmosphere was determined at eight measuring stations. More measuring stations were set-up in the main direction, i.e., east and northeast of the emission source. All stations were arranged in distances of 200 to 3000 m from the emission source. The measurements were taken every two weeks with the aid of an automobile. At each station, 40 individual measurements were taken between July 1968 and June 1970. The air was drawn through two subsequent absorption vessels at a speed of 5 l/min each of which was filled with 15 ml 0.05 N NaOH. The fluorine concentration was determined by measurement of the extinction at a wave length of 530 nm. The highest concentrations were measured at a distance of 300 and 1000 m from the stack in a south-eastern direction. The maximum allowable emission concentration for fluorine (0.03 mg/cu m short-term value, 0.1 mg/cu m long-term value) has not been exceeded at any one time or at any point.

15518 APTIC NO. 33848

Hilsheimer, H.

OPERATING EXPERIENCES WITH THE INCINERATOR MANNHEIM, FRIESENHEIMER INSEL. *(Betriebserfahrungen mit der MVA-Mannheim, Friesenheimer Insel). Text in German. Energie (Munich), 23(9):273-275, Sept. 1971.*

The incinerator Mannheim is part of a remote heating and power plant. The entire plant has three oil and two refuse-fired boilers. Since heavy corrosions occurred, the main combustion zones were lined with a slag resisting mass. Also, combustion takes place now at an air surplus of n equals 1.57. Through this measure, the maximum carbon monoxide values have been reduced to 0.2% by volume from 0.5 to 0.6% by volume. Since the presence of CO in the flue gas is an indicator for the corrosion processes in the so called reducing atmosphere, the corrosions have been cut back.

15519 APTIC NO. 33551

Keairns, D. L. and D. H. Archer

NEW DIRECTIONS IN POWER GENERATION--FUEL CELLS. *Preprint, American Society of Mechanical Engineers, New York, Fuels Div.; Inst. of Fuel, London (England); Inst. of Combustion and Fuel Technology of Canada, Ottawa, (Ontario), p. 18.32-18.50, 1970. 1 ref. (Presented at the North American Fuel Technology Conference, Ottawa, Ontario, May 31-June 3, 1970, Paper ASME-NAFTC-5.)*

High temperature solid-electrolyte fuel cells have the capability of producing electrical energy from fossil fuels at high efficiency in large scale power plants. Westinghouse, under contract to the Office of Coal Research, is developing solid-electrolyte fuel cells for large scale power generation using coal. The type of large scale fuel cell power system envisioned comprises fuel cell battery tubes, each containing many individual cells connected in series; a process for producing carbon monoxide and hydrogen fuel gases from coal; a means for cleaning and circulating the fuel gases; and a means for transferring the heat produced by the fuel cells to the endothermic coal gasification reactions between carbon and carbon dioxide and water. The potential advantages of the fuel cell power system are: high over-all operating efficiency near 60%, minimum air pollution, minimum thermal pollution, reduced plant size, and minimum cooling water requirements. A 100-kilowatt process development plant has been designed as a means to provide technical and economic information for the design of an economical and reliable coal-burning fuel cell power plant, to test fuel cell battery performance and life under actual operating conditions, and to provide operating experience with an integrated system. (Author abstract)

15520 APTIC NO. 34031

Keller, J. G.

UNLEADED MOTOR FUEL AND THE VALUE OF OCTANE. *American Petroleum Inst., New York, Div. of Refining, Proc. Am. Petrol. Inst., Div. Refining, vol. 51:898-921, 1971. (Presented at the Midyear Meeting, 36th, San Francisco, Calif., May 12-14, 1971.)*

Strong social, legislative, regulatory, and technical pressures are expected to cause the use of lead alkyls as octane improving agents to be phased out of motor fuel in the United States. A study of the relationship of octane number to engine compression ratio and thus to efficiency indicates that higher compression ratios and higher octane numbers are desirable. The customer would obtain lower transportation costs up to 97 unleaded pool Research octane number. He would benefit substantially in two or three-grade marketing systems over a single system at all levels of pool octane number. Also, natural resources (crude petroleum equivalent) are conserved as pool Research octane number increases up to 97 Research octane number. (Author abstract modified).

15521 APTIC NO. 33710

Kifune, Ikuei, Ryuichi Sugai, Yoshio Urushiyama, and Eiko Abe

INVESTIGATION ON AUTOMOBILE EXHAUST GASES IN NIIGATA CITY. *(Niigata shinai ni okeru jidosha haiki gasu chosa hokoku). Text in Japanese. Niigata-ken Eisei Kenkyusho Shudankai Shoroku (Niigata Prefect. Public Health Lab. Meet. Abstr.), 1970:21-22, 1970.*

Automobile exhaust gases were monitored and measured at four main intersections of Niigata City. Carbon monoxide was measured by high volume air sampler, and lead concentration was determined by atomic absorption spectrometry. Traffic volume from 8:00 am-6.00 pm was calculated each for ten minutes on the hour. The traffic volume mean values were 1050 cars/ten minutes at the line Toko crossroads and 400 cars/ten minutes at the Yamanoshita Boseki, Sekiya Dankuro, and Furumachi crossroads. The mean CO value was 6.4 8 ppm, with the maximum at 9.8 - 12 ppm. A reciprocal relationship between CO and numbers of running cars for all time-zones was established for two intersections. The maximum and minimum lead values were 3.81, 2.02 micrograms/cu m at two separate crossroads. For correlations between lead and dust concentrations the rate of lead in dust was 0.6% for rainy and 0.2% for fine days at the Toko line crossroads.

15522 APTIC NO. 33652

Kimura, Kikuji

TEN YEARS OF STUDIES ON DUST PARTICULATES. *(Funjin kenkyu no ju-nen). Text in Japanese. Rodo Kagaku (J. Sci. Labour, Tokyo), 47(10):568-570, 1971.*

Studies have been made in the past ten years concerning dust particulates with regards to measuring methods, filter dust collectors individual samplers, dust impactors, spectrographic filter collectors, electric dust collectors, impingers, and membrane filters. With regards to human health, maximum permissible concentrations, environmental concentration and individual exposure, and dust particulate accumulation in the respiratory system were studied. The effectiveness of horse (?) masks was studied concerning breathing protective gear. Studies were also made on aerosols, its measuring method, its damage on buildings, its chemical composition, and the relationship between aerosols and dust particulates.

15523 APTIC NO. 33917

King, William R.

DEFINING AND CONTROLLING HYDROCARBONS FROM PROCESS EMISSIONS. *Preprint, Tennessee Univ, Knoxville, 20p., May 1971. 4 refs. (Presented at the Symposium on the State of-the Art of Air Pollution Control Techniques for Industrial Processes and Power Generation, Knoxville, Tenn., April 22-23, 1971.)*

The relative importance of stationary sources as sources of hydrocarbon pollutants were reviewed. Mobile sources were the major hydrocarbon emitters in 1968. Open burning, industrial processes, solvent evaporation, solid waste disposal, and gasoline marketing together contributed the remaining 50% of the emissions. The Environmental Protection Agency worked to define hydrocarbon pollution and control. The program s tasks are to identify, characterize, and rank all significant stationary sources of hydrocarbon emissions, to characterize the effluent streams from major stationary sources in terms of concentration, flow rates, temperature, and other parameters that could influence control techniques, and to evaluate, both technically and economically the existing and potential control technology for selected, major emission sources. A study of the economics of solvent recovery versus substitution of relatively large solvent-degreasing operations was made. The two regeneration cycles considered were the traditional thermal cycle and the pressure cycle. In the thermal cycle, carbon adsorbs trichloroethylene (TCE) until the bed is saturated. During regeneration, the bed is heated, thus increasing the partial pressure of TCE over the bed so that it can be swept from the adsorber in a much concentrated form. In the pressure cycle, regeneration is accomplished by lowering the system pressure to the point at which the partial pressure of TCE over the bed becomes large compared to the system pressure. Recovery is economically attractive.

15524 APTIC NO. 33622

Kroms, Anton

THE EXPANSION OF THE POWER GENERATION SYSTEM. *(Zur Erweiterung eines Energiesystems). Text in German. Elektrizitaetswirtschaft, 70(20):591-600, 1971. 32 refs.*

The power generation system is influenced by an unprecedented increase of power demand. The demand has reached such proportions that not only are the availability and costs of the primary energy carriers of importance, but also the requirements for protection of the environment are important. Most power plants use fossil fuels such as coal, oil, and natural gas as sources for the energy production. Electric power plants have become the largest consumer of coal. In the past few years difficulties arose with the use of coal. They are primarily caused by the new regulations concerning environmental protection. The use of sulfur-containing coal has been coupled with the demand to install desulfurization systems which are costly and not yet sufficiently developed. This fact has brought the coal in close competition with nuclear power. Despite this, however, it is forecast that the coal consumption by power plants will further rise until the turn of the century, when it will begin to go down.

15525 APTIC NO. 33705

Kurosawa, Keiji

ADAPTATION OF SMALL BLAST FURNACES AS INCINERATORS. *(Kogata koro o shokyakuro ni tenyo). Text in Japanese. Kagaku Kojo (Chem. Factory), 15(10):4-6, Sept. 1971.*

The possibility of adapting small blast furnaces as urban waste incinerators is examined. A 900 cu m blast furnace should have the capacity to burn more than 1500 tons of urban waste, regardless of plastic or water content, without generating secondary pollution. For trash incineration, the combustion exhaust gas is proportionate to the heat quantity produced; absolute dry heat capacity is approximately 4000 kcal/kg; therefore, approximately 1700 tons/day dry material or 2500 tons/day wet waste, can be burned. There are three blast furnaces of 1700 tons/day capacity and one of 2100 tons/day capacity in the Kawasaki area. An incineration capacity of 10,000 tons/day can accommodate most of waste from the Tokyo, Yokohama, and Kawasaki areas. When trash is pressed, the volume of one ton of dry material is 2 cu m. Use of railroads to facilitate transport and present methods are reviewed.

15526 APTIC NO. 34078

Larke, W. M.

OPENING ADDRESS BY THE CHAIRMAN OF THE IRON AND STEEL ENGINEERS GROUP. *Iron Steel Inst. London, Spec. Rept., no. 61:1-3, 1958. (Presented at the Iron and Steel Institute, Air Pollution Meeting, London, England, Sept. 25-26, 1957.)*

The background of the iron and steelworks is reviewed with respect to political, sociological, and economic factors. Historical data on various abatement measures, control methods for emissions from the works, regulations, invention patents, and legislation are examined. Existing problems of grit, fume, dust and sulfur dioxide discharges are discussed.

15527 APTIC NO. 33751

Lerescu, Carmen and Doina Ivanescu

SULFUR COMPOUNDS IN CRUDE OIL FRACTIONS UP TO 300 C. GENERAL SCHEMES FOR DETERMINING THE SULFUR COMPOUNDS. *(Compusi cu sulf in fractiunile de titei pina la 300 C. Scheme generale pentru determinarea compusilor cu sulf). Text in Rumanian. Petrol Gaze, 22(7):419-425, 1971. 41 refs.*

Sulfur compounds were determined in the lower and medium distillates or Iranian (IP) and Romaskino (RP) petroleum samples. Chemical analysis revealed that the sulfur content of the lower fractions (60-150 C) was low as compared to the total sulfur content of the respective samples. The amount of sulfur in each subfraction increased with the increase of the boiling point (B.P.); for RP, it was 0.016% in the 60-95 C subfraction and 0.028% in the 122-150 C subfraction. The respective figures for IP were 0.026% and 0.040%; none of the fractions studied had free sulfur or hydrogen sulfide; the amount of sulfides and disulfides increased with increase of B.P. while the reverse was true for mercaptans and residual sulfur. The latter two categories of compounds actually prevailed in the lower subfractions (60-95 C). The sulfur compounds present in the medium fractions (150-25 C for RP and 200-300 C for IP) were analyzed according to Prinzler s method; the separation of sulfur compounds from hydrocarbons were done by means of liquid-solid chromatography on silica gel. Sulfur compounds were identified in three of the seven eluates obtained (the other four eluates were made of hydrocarbons). According to the eluate, the proportion of sulfur compounds varied from 1.8 to 4.730% for RP and from 1.8 to 4.30 for IP; mercaptans varied from 0.031 to 0.008% and from 0.10 to 0.03%, respectively; H2S was not present. The concentration of disulfides, aromatic disulfides, and aliphatic disulfides was generally lower in RP than in IP.

15528 APTIC NO. 34303

Macey, H. H.

THE MEMORANDUM ON CHIMNEY HEIGHTS AND MODERN OIL-FIRED BOILERS. *Clean Air (J. Clean Air Soc. Australia New Zealand), 5(3):49-52, Aug. 1971. 5 refs.*

A simple correction is suggested to heights determined from the Memorandum on Chimney Heights, first published by the United Kingdom Ministry of Housing and Local Government in 1963 and revised in 1967. Application of the correction will give the original acceptable ground level sulfur dioxide concentration for modern boilers, which require less excess air than those for which the Memorandum was designed, and for which the plume rises are smaller. After obtaining a height from the Memorandum in the usual way, thy height should be further increased by a percentage which is numerically equal to that height in feet divided by ten.

15529 APTIC NO. 33765

McElroy, Michael B. and John C. McConnell

NITROUS OXIDE: A NATURAL SOURCE OF STRATOSPHERIC NO. *J. Atmospheric Sci., 28(6):1095-1098, Sept. 1971. 33 refs.*

Possible environmental effects of emissions by supersonic transport planes currently under development to cruise in the stratosphere are examined. In particular, nitric oxide emitted by these aircraft may catalytically affect atmospheric ozone. Photodissociation of nitrous oxide provides an important in situ source of stratospheric NO. Additional destruction occurs chemically by the reaction between O(1D), produced mainly by photolysis of ozone, and N2O. The natural source was compared with estimates for the source due to a fleet of 500 planes cruising for an average of 7 hours/day. The natural and artificial inputs above 15 km are of comparable magnitude. The natural source corresponds to a net production of NO, averaged over the globe, of about 2 times 10 to the 7th power molecules/sq cm/sec, and offers a yardstick for judging the possible significance of any artificial input. Additional sources of stratospheric NO, due to downward diffusion from the ionosphere and upward transport from the earth s surface, are discussed but were not quantitatively estimated. (Author abstract modified)

15530 APTIC NO. 33557

McGarry, Frederick J. and Constantine J. Gregory

A COMPARISON OF THE SIZE DISTRIBUTION OF PARTICULATES EMITTED FROM AIR, MECHANICAL, AND STEAM ATOMIZED OIL FIRED BURNERS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 28p., 1971. 4 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 64th, Atlantic City, N. J., June 27-July 2, 1971, Paper 71-12.)*

Thirty-three samples were collected with an Andersen Stack Sampler, which operates on the principle used in a cascade impactor. The collecting equipment included the sampler with quarter-inch nozzle; an 8-ft probe to which the sampler was attached; a condensation bottle; an air flow meter with a mercury manometer capable of reading up to an eleven inch vacuum; a hose clamp; and an aspirator. The samples were taken at three equally spaced locations across the middle of an 18-by 4.6-ft duct running from the economizer to the air heater, one of the few accessible sampling areas. After sampling, the instrument was cooled to room temperature and the individual plates with the collected dust samples weighed on an analytical balance and compared with their tare weights measured prior to the test. The air atomized unit produced the greatest percentage weight of particulates in the range from 3.3 to 0.1 micron. The mechanical atomizer produced the greatest percent weight in the 9.2 to 3.3 micron range. The steam atomized unit, with the exception of the 30.0 to 9.2 micron range, had percent weights which did not predominate in any particular size range. (Author abstract modified)

15531 APTIC NO. 34030

McMullen, Robert N.

LAND CLEARING AND RIGHT-OF-WAY DISPOSAL PROBLEMS. *J. Environ. Health, 34(2):211-212, 233, Sept./Oct. 1971. (Presented at the Educational Conference, 35th Annual, Portland, Ore., June 28, 1971.)*

The magnitude of the problem of outdoor burning depends on several factors; some of these factors are location, rural or urban, length of time it will take to burn, and meteorological conditions or abrupt changes after ignition. In general, the low temperature of outdoor burning increases the particulate emissions, carbon monoxide, and hydrocarbons, while suppressing the sulfur oxides and nitrogen oxides. Alternatives to outdoor burning included the following: disposal in a sanitary landfill; cut the marketable timber; utilization of total chips for the production of paper; and burning in an eight ft deep trench with the aid of a blower for complete combustion.

15532 APTIC NO. 34040

Medeiros, Robert W.

LEAD FROM AUTOMOBILE EXHAUST. *Chemistry, 44(10):7-9, Nov. 1971. 5 refs.*

Air pollution due to leaded gasoline consumed in motor vehicles was examined with respect to background material on lead in gasoline, octane rating as a measure of engine performance, and conversion of tetraethyl lead in the gasoline to lead bromide and lead chloride. The direct correlation between increased lead content in city air and traffic conditions demands new research into gasoline additives. Control methods for lead emissions from motor vehicles include low-lead or lead-free gasolines and substitutes for lead in gasolines.

15533 APTIC NO. 33700

Mitzinger, Wolfgang

THE DEVELOPMENT OF POWER GENERATION, THE PLANNED CREATION OF A SOCIALIST CULTURE IN THE GERMAN DEMOCRATIC REPUBLIC AND THE UTILIZATION OF SECONDARY RAW MATERIAL. *(Die Entwicklung der Elektroenergieerzeugung, di planmaessige Gestaltung einer sozialistischen Landeskultur in der DDR und die Sedundaerrohstoffnutzung). Text in German. Energie Tech., 21(8):329-336, Aug. 1971. 5 refs. (Presented at the Internationalen Kolloquiums, Kraftwerkstypische Sekundaerrohstoffe, 1st, Karl-Marx-Stadt, East Germany, May 20, 1971.)*

In the German Democratic Republic, 90% of the electric power is generated by the combustion of fossil fuels. The combustion process removes large amounts of oxygen from the atmosphere and returns to the atmosphere an even larger quantity of waste gases and pollutants. An 1000 MW power plant emits 150 million cu m of waste gas/day. Environmental pollution by waste gases must be taken into consideration when constructing new power plants. Stacks some 300 m in height have been erected for better dilution of the emitted sulfur dioxide at two older power plants in industrial centers. However, future power plants must first study the effect of the waste gas on the environment before constructing the plant.

15534 APTIC NO. 34290

Murphy, R. P. and J. F. Pottinger

AIR POLLUTION FROM WOOD WASTE INCINERATION. *Clean Air (J. Clean Air Soc. Australia New Zealand), 5(2):26-30, May 1971. Presented at the Australian Waste Disposal Conference, New South Wales Univ., Australia, 1971.)*

About 70% of wood wastes from timber processing in New South Wales, Australia, are disposed of by incineration, which can give rise to excessive emissions of smoke, odors, ash, and charred particles if not carried out in a properly designed incinerator equipped with adequate pollution controls. Emissions from wood waste combustion are related to the components of wood: moisture, volatile matter, fixed carbon, and ash. Emission data and design considerations are given for refractory incinerators, conical or tepee burners, and wood-fired boilers. Tests were conducted which, together with other evidence indicate that tepee burners in their present form cannot meet the requirements of the New South Wales Clean Air Act, although they are widely used because of their low cost and flexibility. Design improvements are suggested. Successful control of smoke emissions from boilers is possible with secondary air jets. Provisions of the Clean Air Act and government standards for incinerators in New South Wales are reported.

15535 APTIC NO. 33365

Myers, P. S.

SPARK IGNITION ENGINE COMBUSTION AND LEAD. *J. Wash. Acad. Sci., 61(2):58-74, 1971. 36 refs.*

Lead is used in gasoline to prevent knock, i.e., to permit the last part of the air-fuel mixture to burn, to withstand higher pressures and temperatures before auto-igniting. The ability to withstand higher thermal stresses permits higher compression ratios, which in turn give better fuel economy and higher power output. The addition of lead does not affect the cool flame limits during motored operation but definitely affects auto-ignition limits. Lead does not seem to significantly affect energy release rates. However, its effect on auto-ignition limits can differ between different fuels. It appears that the lead must first decompose to lead oxide and that different kinds of lead oxides have different antiknock capabilities. Different fuels have different antiknock characteristics. Thus removal of lead, which will cause a decrease in gasoline antiknock quality, must be accompanied either by a reduction in engine compression ratio or a change in refining techniques to produce fuels having higher antiknock properties. It appears that removal of three cc of lead plus reduction in compression ratio would give an increase in fuel consumption of as much as 10%. Lead also affects combustion chamber deposits which in turn affect knock and, to a lesser extent, exhaust emissions. There is some evidence to indicate that deposits from unleaded gasoline cause a higher increase in antiknock requirement than do deposits from leaded gasoline. There is also some evidence to indicate that leaded deposits cause slightly higher exhaust emissions. Lead normally acts as a poison for catalysts to reduce exhaust pollutants but does not seem to affect exhaust pollutant reactions per se. (Author abstract)

15536 APTIC NO. 34003

Nuwa, Akio

DISTRIBUTION OF SULFUR OXIDE IN CEMENT KILN. *(Semento kirun ni okeru iosankabutsu no bunpu jotai). Text in Japanese. Netsu Kanri (Heat Management: Energy and Pollution Control), 23(9):8-13, Sept. 1971. 5 refs.*

The sulfur dioxide content in the exhaust gas from a cement kiln is far smaller than expected judging from the sulfur content in the original material or fuels. The sulfur content of the original material (lime and clay) is 0.1% and sulfur trioxide is 0.25%; the dust mixture has 7.0% of SO3 and 2.8% of S. The total material put into the kiln has 0.95% of SO3 and 0.38% of S. Cottrel dust has 9% of SO3 and 3.6% of S; boiler dust has 4% of SO3 and 1.6% of S; clinker has 0.45% of SO3 and 0.18% of S. The ratio of dust mixed in the material was changed to see the effects on the SO3 content in the recovery dust and clinker, to determine how much SO3 escaped in the exhaust gas. When 15% of dust was mixed in the original material of lime and clay, the SO3 content in the recovery dust was 7.24 and in clinker, 0.46; when the dust ratio was 7.0%, SO3 in the recovery dust was 6.04% and 0.50 in clinker; when no dust was added, SO3 was 2.63 in the dust and 0.44% in clinker. Alkali in the cement material does not evaporate but becomes alkaline sulfuric acid salt in the kiln, and very little SO2 or SO3 escape in the exhaust gas. When no dust was mixed in the original material, a small amount of alkali remained in the recovery dust, therefore SO3 in the clinker would be reduced slightly. But the amount of SO3 in the clinker remained approximately the same and seemed to have no relationship with the amount of the dust mixture.

15537 APTIC NO. 33648

Pachernegg, Siegfried J.

EXPERIMENTS WITH THE SINGLE CYLINDER ENGINE FOR DEVELOPMENT OF DIESEL ENGINES WITH HIGH CHARGING AND HIGH RATE OF REVOLUTIONS. *(Experimente am Einzylinder-Motor zur Entwicklung von Diesel- mit hoher Aufladung und hoher Drehzahl). Text in German. Motortech. Z. (Stuttgart), 32(10):356-360, Oct. 1971. 7 refs.*

A single-cylinder, turbocharged engine was tested on a specially constructed dynamometer to determine its ability to operate at up to 75 hp/l. Combustion was characterized by the face that the first 60-70% of injected fuel burned at the moment of injection while the residual 30-40% required almost twice the time. This had a negative effect on combustion efficiency and resulted in soot formation. With the exception of nitrogen oxides, the emission of unburned components (soot, carbon monoxide, and, to a lesser extent, hydrocarbons) and odors depends on the second phase of the combustion period. Exhaust gas analysis revealed a concentration of 1.5% of unburned or incompletely burned components of the fuel referred to the supplied fuel heat. Therefore, the degree of conversion was 98.5%.

15538 APTIC NO. 33828

Papetti, R. A. and F. R. Gilmore

AIR POLLUTION. *Endeavour, 30(111):107-114, Sept. 1971. 32 refs.*

Sources of air pollution are discussed, as well as its distribution, harmful effects, and mathematical modeling. The number and size distribution of atmospheric particles is controlled by the balance between their continual generation, transport, chemical and physical alteration, and removal. The relative importance of gravitational settling and diffusion due to Brownian motion is discussed. Sources and urban concentrations of the oxides of sulfur are indicated, as well as photochemical smog constituents, carbon monoxide, and metals. The influence of wind, turbulence, and stability on air pollution is discussed. Visibility may be reduced due to aerosols or nitrogen dioxide. Unpleasant odors may result from sulfur compounds. The harmful effects of air pollution that can be treated in simple economic terms include damage to materials, to agricultural crops, and livestock. Physiological effects and health impairment are also discussed. Mathematical models for calculating air quality are considered.

15539 APTIC NO. 34131

Patterson, Donald J., B. Carnahan, R. H. Kadlec, H. A. Lord, J. J. Martin, W. Mirsky, and E. Sondreal

KINETICS OF OXIDATION AND QUENCHING OF COMBUSTIBLES IN EXHAUST SYSTEMS OF GASOLINE ENGINES. (PROGRESS REPORT). *Michigan Univ., Ann Arbor, Dept. of Mechanical En-*

gineering, Coordinating Research Council Contract CAPE-8-68(1i68)-CRC and Air Pollution Control Office Contract CPA-22-69-51-HEW, 82p., Dec. 1970. 45 refs.

NTIS: PB 198079

Originally, the intent was to follow an elemental volume of exhaust gas from the time it left the exhaust valve of a gasoline engine to the time it entered the atmosphere. Chemical and physical measurements on this volume were to be resolved both spatially and temporally. However, the study is now being directed towards needed new reaction data for pertinent chemical classes and species using an experimental well-stirred two-tank reactor system. This information will be used in a computer simulation to predict reactor performance under a variety of conditions, including time varying inputs. Therefore, emphasis is being placed on determining gross rate constants for carbon monoxide, oxygen, total hydrocarbons, and hydrocarbon classes, taking into account the residence time distribution of these species within the reactor. Using the rate data obtained from the experimental two-tank reactor, a computer model is being developed to simulate the overall chemical kinetics of the reaction processes in the engine mounted reactor. (Author introduction modified)

15540 APTIC NO. 33822

Pierson, William R., Wanda Brachaczek, and Joseph T. Kummer

SEARCH FOR AIRBORNE PARTICULATE DEBRIS FROM RUBBER TIRES. *Am. Chem. Soc., Div. Water Air Waste Chem., Gen. Pap., 11(2):236-244, 1971. 13 refs. (Presented at American Chemical Society, Division of Water, Air and Waste Chemistry, National Meeting, 162nd, Washington, D. C., Sept. 12-17, 1971.)*

To determine how much of the material lost from rubber tires becomes airborne particulate matter, air collected from exhaust ducts and from the vicinity of tunnel exit ports was analyzed for styrene-butadiene rubbert (SBR), zinc, bromine, and lead by infrared adsorption spectroscopy. The results are presented as Zn/Pb, Zn/Br, and SBR/Pb ratios, under various meteorological conditions, between amount of tire particulate and amount of gasoline-engine exhaust particulate. The tire data pertain to tires of all vehicles. The lowest results are presumably the more definitive ones since all are upper limits. The ratios indicate that there is, at most, less than 40% as much particulate matter from tire wear as from exhaust. The upper limit on tire particulates suspended in the atmosphere should be lower, as tire-wear particles tend to be bigger than exhaust particles. On the other hand, tire-wear conditions at the two tunnel sites are relatively mild, and more work will be necessary to justify dismissing tire particulates as a relatively insignificant concern.

15541 APTIC NO. 33570

Poole, W. Kenneth and Donald R. Johnson

ESTIMATING POPULATION EXPOSURE TO SELECTED METALS - TITANIUM. (FINAL REPORT). *Research Triangle Inst., Research Triangle Park, N. C., NIEHS Contract PH-86-65-109, RTI Rept. AU-229, Rept. NIH-ES-2434, 101p., March 1969. 50 refs.*

NTIS: PB 195819

Three aspects of titanium in the environment are discussed: the flow of titanium from the time it is mined until it is consumed; the exposure of subpopulations occupationally exposed to titanium; and the exposure of the general population to titanium via air, food, and water. Occupational exposure to titanium in the air has been found to be absent. Apart from open pit operation, the mining industry has no significant exposure problem. Among manufacturers using titanium concentrates, pigment plants and titanium metal plants have been suggested as sources of possible excessive exposure. Exposures to titanium dioxide pigment may be considerable in some manufacturing processes, such as rubber, and negligible in others, such as hosiery. Assuming a daily respiratory volume of 20 cu m, the amount of titanium taken into the body by inhalation of urban air is 1.2 milligram/day. Deposition of particulate matter in the lung is a function of particle size; a mass median diameter of 0.3 micron is assumed. The daily retention fo titanium has been estimated to be 0.32 milligram. This estimate reflects that portion of deposited titanium not removed by lung clearance mechanisms. Food appears to be the significant source of titanium exposure to the general population; estimated titanium dose from a typical diet is 607 milligrams. Normal water intake is three milligrams.

15542 APTIC NO. 33955

Radford, Edward P.

AIR POLLUTION PROBLEMS IN NUCLEAR POWER DEVELOPMENT. *Preprint, American Medical Association, Chicago, Ill., 10p., 1970. (Presented at the Air Pollution Medical Research Conference, New Orleans, La., Oct. 5-7, 1970.)*

Many phases of nuclear power development are being achieved with relatively little environmental contamination with hazardous radionuclides, and in these instances the promise of a pollution-free power source can nearly be achieved. However, there are two principle sources of air pollutants from nuclear power operations. At plant site, boiling water reactors release airborne noble gases, chiefly xenon isotopes, while at nuclear fuel reprocessing plants, release of gaseous krypton 85 and tritiated water vapor are potentially important air pollution problems. At present, the nuclear power industry is the only major industry whose operations will inevitably lead to the distribution of mutagenic material to the general population, and for this reason close regulation of the industry is mandatory. (Author summary modified)

15543 APTIC NO. 33883

Rayzacher, B.

THE OIL INDUSTRY AND THE ENVIRONMENT. *Stichting Concawe, The Hague (Netherlands), Rept. 8/70, 17p., April 1970. 15 refs.*

The initial step in oil production, recovery of the crude oil from its natural deposits, does not have any appreciable adverse environmental effects. Transport by ocean tanker, pipeline, and road and river tankers does often cause pollution of the soil, land and surface, and of ground and surface waters. Malodorous emissions during the refining process are complicated by the numerous points, some a considerable distance from the ground, where leakages may occur, and by the human olfactory sense which can detect the presence of some compounds at extremely low concentrations. Good maintenance and constant equipment control are required. Sulfur emissions in the refining process stem from the frequent use of high-sulfur fuels for various plant operations and from flare burn-off. Control methods in the former case include desulfurization and dispersion by tall stacks. Water pollution and noise problems from refining are also discussed. Wrong or negligent use of petroleum products contribute to air and water pollution, but here correction rests to a large degree with the individual user. For example, by correct adjustment of the carburetor and ignition, automotive exhaust emissions can be reduced by up to 50%. The costs of producing unleaded no-knock gasolines, of desulfurizing fuel oils, and of using naturally low-sulfur fuels are discussed.

15544 APTIC NO. 34165

Reed, Robert D.

STACK PLUMING FACTORS. *Preprint, National Petroleum Refiners Association, Washington, D. C., 4p., 1970. (Presented at the National Petroleum Refiners Association, Western Regional Meeting, Salt Lake City, Utah, Sept. 22-23, 1970, Paper WR-70-63.)*

Many petroleum refinery stack plumes are not innocent water vapor but rather are potential air polluters. The vent-stack of cat-crackers is typical; the constituents of the plume may be hydrogen, carbon dioxide, carbon monoxide, oils, synthesized organic compounds, sulfur compounds, water vapor, and catalyst fines. The solution to controlling plume material lies in the application of a specific burner design and utilization immediately at the point where the cat-cracker gases are discharged to the atmosphere. Sulfur trioxide plumes can be controlled by direct firing of fuel into the stack for temperature elevation high enough to allow an adequate state of diffusion into the atmosphere prior to dew-point temperature.

15545 APTIC NO. 33650

Rohrbach, Hans

SOME OPERATING PROBLEMS WITH PULVERIZED COAL ENGINES. *(Einige Betriebsprobleme des Kohlenstaubmotors). Text in German. Motortech. Z. (Stuttgart), 32(10):379-385, Oct. 1971.*

Development and mode of operation of the single-cylinder engine operated with pulverized coal are discussed. Engine exhaust gases were analyzed by passing them through a cloth filter two m in diameter and 10-m long. The filter fine enough to retain particles smaller than one micron. Analysis of the retained dust showed that particles less than four micron were not present. They had been completely burned. Particles from four to 10 micron were found in the filter. They were coked on the surface and completely dry. The use of pulverized coal with grain sizes of four micron and less would eliminate dust from exhaust gas.

15546 APTIC NO. 33350

Rossini Frederick D., Philip Myers, Bruce Bailey, S. I. Meisel, G. J. Stopps, A. L. Aronson, Gary Ter Haar, Bruce H. Simpson, and A. F. Forziati

PANEL DISCUSSION. SCIENCE AND THE ENVIRONMENT (I) - LEAD IN GASOLINE. *J. Wash. Acad. Sci., 61(2):138-147, 1971. (Presented at the Symposium Science and the Environment, Washington, D. C., Jan. 21, 1970.)*

A panel discussion considered the effect of lead in gasoline. The indiscriminate setting up of standards, which are technologically unattainable within the given time schedule, will seriously cripple the economy of our society and tend to immobilize a very mobile society. Problems in acquiring a definition of particulates in emission testing procedures are indicated. The generation of ammonia and other emissions from the tailpipe is cited. Cost-benefit considerations and the control of lead emissions are mentioned.

15547 APTIC NO. 33853

Ryder, R. J. and J. J. McMackin

SOME FACTORS AFFECTING STACK EMISSIONS FROM A GLASS CONTAINER FURNACE. PART I. *Glass Ind., 50(6):307-310, June 1969. (Presented at the Conference on Glass Problems, 29th, Nov. 21, 22, 1968.) PART II. Ibid., 50(7):346, 348-350, July 1969. 4 refs.*

A glass melting furnace can give off emissions from the flame and from volatilization. Sulfates, fluorides, and borates are major constituents that contribute to volatilization. A small percentage of these materials becomes stack gas and can cause air pollution. A glass furnace was tested to determine the amounts of particulate matter, sulfur dioxide, sulfur trioxide, carbon monoxide, hydrocarbons, and nitrogen oxides in the stack gas. Also, the plume s opacity was determined. Variation in the furnace load, temperature, fuel-air ratio, and make-up of minor ingredients could effect stack emission. The particulate emission (primarily sodium sulfite), SO2, SO3, and nitrogen oxides increased as the furnace load (and thus temperature) increased. An increase in excess air from 20-25% to 30-35% produced decreases in the level of particulate emission. The addition of carbon to the minor-ingredient mix eliminated this. Also, the addition of carbon was the most effective single factor in decreasing particulate emission. The apparent opacity was influenced by the fuel-air ratio but was not affected by the minor-ingredient mix. Furthermore, increases in excess air in the 20-40% range caused significant opacity decreases. As expected, the opacity increased as the furnace load increased. Because of Los Angeles regulations, the maximum load is dictated by the level of particulate emission and stack plume opacity.

15548 APTIC NO. 33866

Sableski, Joseph J. and William A. Cote

AIR POLLUTANT EMISSIONS FROM APARTMENT HOUSE INCINERATORS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 49p., 1971. 12 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 64th, Atlantic City, N. J., June 27-July 2, 1971, Paper 71-171.)*

A test program was designed to evaluate the operation of the air pollutant emission from apartment-house incinerators. The units tested were equipped with the most recent controls for combustion efficiency and particulate removal. Test incinerators were both single and multiple chamber with single and double flues. All units were equipped with gas washers. Other features included charging gates, forced overfire air, draft control dampers, and automatic programming devices. Operating parameters such as burning rate, primary chamber draft, secondary chamber temperature, gas washer water flow rate, and pressure drop were monitored. Contaminants measured included particulates, carbon monoxide, hydrocarbons, carbonyls, and nitrogen oxides. The test results indicate operational deficiencies as well as unacceptable pollutant emissions from some units. Burning at rated capacity could not be achieved in several units because of high grade loadings. Combustion temperatures in all units were below the 1200-1400 F range required for destruction of volatile and odorous material. Primary chamber draft was somewhat controlled in those units with forced air and draft control dampers. Particulate emissions reported on a mass basis rather than on carbon dioxide-corrected concentration basis proved to be the most consistent means of comparing test data because of the low concentration of CO measured. The single-chamber units had unacceptable particulate emissions compared to representative emission regulations. The multiple chamber units had considerably lower particulate emissions and the best performance was achieved by those units that operated with primary chamber draft between 0.10 and 0.25 inches of water. Apartment-house incinerators should be designed with multiple chambers, double flues, forced overfire air and draft control, gas washers, charging gates, primary and second auxiliary burners, and a programming system. (Author abstract modified)

15549 APTIC NO. 34096

Schmidt, E.

FORMATION AND EMISSION OF AIR-POLLUTING SUBSTANCES IN BRICKWORKS KILNS. *(Auswurf und Entstehung luftverunreinigender Stoffe bei Ziegeloefen). Text in German. Ziegelind. (Weisbaden), no. 24:560-571, 1968. 14 refs.*

Emission measurements for 60 brick ovens revealed that soot emission levels from old ovens with simple combustion installations often exceed maximum permissible levels while modern kilns easily conform to prescribed standards. The median sulfur dioxide emission was 0.5 g/N cu m, but emission levels varied rather widely. Sulfur oxides from brick kilns contained a considerably higher share of SO3 than emissions from other types of furnaces. Fluorine concentrations ranged from 1 to 184 mg/N cu m (median level, 48 mg/N cu m). The emission of sulfur oxides and fluorine is governed by the composition of the materials used in brick manufacture, especially the lime content, and by the firing temperature. Emissions increase with higher firing temperature and decrease with lime content.

A higher emission of sulfur oxides is usually accompanied by higher fluorine emissions. To comply with prescribed emission standards for sulfur oxides, stack heights of 20 to 40 m are necessary; for fluorine, from 20 to 50 m. In special cases high stacks will not suffice and the blowing of powdered magnesite or of dolomite into the furnace may be necessary.

15550 APTIC NO. 34227

Schoenberger, R. J., P. W. Purdom, S. J. Levy, and H. I. Hollander

CHARACTERIZATION AND TREATMENT OF INCINERATOR PROCESS WATERS. *American Society Mechanical Engineers, New York, Proc. Natl. Incinerator Conf., Cincinnati, Ohio, 1970, p. 204-215. 8 refs. (May 17-20.)*

Process waters from two incinerators were sampled and analyzed. Incinerator water effluents vary considerably between the respective sources and the water leaving the process and also between different incinerator plants, and comparison of results from the two plants indicates that the character of each system must be evaluated on an individual basis. Process waters from quenching are different from those of gas-scrubber waters, especially in pH values. The higher volatile organic acid content of the quench water results in a higher oxygen demand. The oxygen demand of the scrubber waters is decreased, probably because of the greater dilution and also because of the minimal amount of unburned organic matter in the flue gas. When sampling gas-scrubber waters, the pH is apparently depressed by carbon dioxide in the flue gas. Mechanical handling of the water thereafter tends to release the CO_2 and thereby raise the pH. If precise information is required, it would be preferable to measure pH by utilizing a pH meter at the time and place of sampling. (Author conclusions modified)

15551 APTIC NO. 34166

Scott, K. A.

FIRE PERFORMANCE OF PLASTICS IN BUILDING. *Brit. Polym. J. (London), 2(5):244-248, Sept. 1970. (Presented at the S.C.I./Royal Inst. of Chemistry,/Inst. of Physics, Joint Meeting, Preston, England, Oct. 4, 1968.)*

The work of the British Plastics Federation Building Group on fire performance of plastics is described. One of the objectives of the program is to assess possible increases in hazard to life from flammability, fire propagation, flame spread, smoke, and toxic combustion products which may arise from the increased use of plastics in buildings are assessed. The fairness, relevance, and effectiveness of standard test procedures required by the existing building regulations are evaluated and test results are presented. Results to date suggest that smoke presents a more immediate hazard than carbon monoxide because it quickly obscures escape routes long before lethal concentrations of CO are formed.

15552 APTIC NO. 34086

Shilling, K.

THE ROLE OF THE SMOKESTACK IN MODERN HEATING TECHNOLOGY. *(Le role de la cheminee dans la technique moderne du chauffage). Text in French. Gaz Mazout, 12(46):59-64, Dec. 1967.*

The volume of smoke for a given caloric output does not vary essentially for solid, liquid, or gaseous fuels. Only the water content of the smoke varies and the height at which the dew point is reached. Condensation from gas begins earlier than that from coke or fuel oil. The combustion of liquid and gaseous fuels produces a lot of water vapor. The temperature of the smoke leaving the furnace must be high enough to prevent the dew point to be reached before discharge of the smoke from the chimney. This can be easily achieved. Corroding acid residues are emitted with the smoke in the form of sulfur dioxide and sulfur trioxide. Fuel oil furnaces produce SO_2 and SO_3 by catalysis which form sulfuric acid vapor with a dew point of 160 C. Not only is the furnace exposed to corrosion, but an acid film forms on the interior walls of the chimney. This phenomenon also occurs when fuels with a low sulfur content are used. The result is corrosion of sheet metal roofs and metal windows. In high-rise buildings in the summer, the furnaces are in operation only for a few minutes at a time to provide hot water so the dew point is reached inside the chimney with resulting humidity and soot accumulation. The chimney should project high enough above the roof, its interior should be smooth, smoke should be discharged with sufficient velocity, and no substantial accumulation of heat in the chimney should occur.

15553 APTIC NO. 33774

Shin, Koo Cheul

A SHORT REPORT ON THE 20TH TECHNICAL CONFERENCE ON REFUSE AT THE UNIVERSITY OF STUTTGART. *(Kurzbericht ueber das 20. Muelltechnische Kolloquium an der Universitaet Stuttgart). Text in German. Muell Abfall, 3(4):109-111, April 1971.*

Industrial refuse contains 84% combustible material which can be incinerated with the domestic refuse. Other industrial refuse, such as gum and plastic, could be mixed with domestic refuse and dumped in a specific area. A large industry produces more refuse than a small industry, yet the amount per employee is relatively smaller than in small industries. During the next 10 years, the amount of combustible materials will increase by 20-30%, textile refuse will increase by 30%, polyethylene will increase five times, and polyvinyl chloride will increase three times. Refuse removal systems are also discussed.

15554 APTIC NO. 33421

Shuman, Fred L., Jr.

INCINERATION TECHNOLOGY PROGRESS REPORT. *Dept. of Agriculture, Washington, D. C., Working Group on Pesticides, Proc. Natl. Working Conf. Pesticide Disposal, Beltsville, Md., 1970, p. 103-107. (June 30-July 1.)*

NTIS: PB 197145

A small model incinerator for the disposal of surplus pesticides was designed and constructed. The construction of the model system incorporated a primary combustion chamber, a secondary combustion chamber, a liquid pesticide feed system, a system for metering and monitoring the fuel, air, and pesticide input, and a system for sampling and monitoring the effluent gases. The variables studied were liquid pesticide feed rate, excess primary combustion air, and excess secondary combustion air. Various pesticide-fuel-air rates were investigated to determine the optimum ratio for minimizing the noxious off-gases. The ranges over which the rates were varied were pesticide, 0.66-2.34 gal/hr; excess primary air, 36.3% to 103.64%; and excess secondary air 1.36% to 68.64%. The sulfur dioxide concentration in the off-gases was a minimum at a rate of 72.6% excess primary air and 18.23% excess secondary air. The carbon dioxide concentration was a minimum at a rate of 63.57% excess primary air and 6/25% excess secondary air. The series of tests did not produce data which would provide for an accurate prediction equation for predicting the performance of the prototype from that of the model.

15555 APTIC NO. 33667

Sies, W.

THE GENERAL SITUATION ON THE LEAD SECTOR. *(Allgemeine Situation auf dem Bleisektor). Text in German. Metall. (Berlin), 25(10):1195-1196, Oct. 1971. (Presented at the Internationalen Blei-Tagung, 4th, Hamburg, West Germany, Sept. 22, 1971.)*

The status of lead emissions from automobiles is reviewed. Due to the higher demand for better automobile performance, lead consumption for the production of tetraethyl lead doubled since 1960, but is projected to decrease after 1975 due to regulations limiting the addition of lead to gasolines.

15556 APTIC NO. 34000

Smolczyk, H.-G. and P. Gunkel

THE POSSIBLITY OF HYDROGEN EMBRITTLEMENT OF REINFORCING STEEL DURING CARBON DIOXIDE ATTACK ON SULFIDE CONTAINING CONCRETE. *(Die Moeglichkeiten einer Wasserstoffversproedung von Spannstahl bei Einwirkung von Kohlensaeure auf sulfidhaltigen Zementstein). Text in German. Werkstoffe Korrosion, 22(10):856-863, 1971. 12 refs.*

Cement mortar has been carbonized and the hydrogen sulfide generated has been quantitatively determined. Measured gas volumes are lower by orders of magnitude than the theoretically expected values. Only a small proportion of the H2S penetrates into the interior of test specimens in the case of a mortar furnace containing 1.19% S, while an H2S concentration some three orders higher was found in a tube of transformed alumina-silicate cement stone. Thus, the mechanism of reinforcing steel embrittlement as described in the literature for alumina-silicate cements cannot be corrected. (Author abstract modified)

15557 APTIC NO. 33564

Spindt, R. S., G. J. Barnes, and J. H. Somers

THE CHARACTERIZATION OF ODOR COMPONENTS IN DIESEL EXHAUST GAS. *Preprint, Society of Automotive Engineers, Inc., New York, 31p., 1971. 9 refs. (Presented at the Society of Automotive Engineers International Mid-Year Meeting, Montreal, Canada, June 7-11, 1971.)*

The chemistry of diesel exhaust odor is discussed. One study separated the exhaust samples into two odor-important fractions and facilitated more complete and comprehensive structure determination. Fuel-like chemical species contributed to the exhaust odor. The aromatic hydrocarbon classes of alkyl benzenes, indenes, indans, tetralins, and naphthalenes were identified. The greatest differences found in two studies were associated with the odor of partially oxidized fuel species. One analysis showed that paraffinic aldehydes were significant odor contributors, while the second suggested that these compounds were present, but were not significant contributors to the characteristic diesel odor. Some of the general classes contributing to the odor were hydroxy and methoxy indanones, methyl and methoxy phenols, furans, alkyl benzaldehydes, alkenones, dienones, and hydroxy cyclocarbonyls. The understanding of the relative contribution of these chemical species to diesel exhaust odor will provide a basis for reduction of diesel odor. (Author summary modified)

15558 APTIC NO. 34032

Stone, R. K.

EFFECT OF FUEL COMPOSITION ON EXHAUST EMISSIONS. *American Petroleum Inst., New York, Div. of Refining, Proc. Am. Petrol. Inst.. Div. Refining, vol. 51:922-935, 1971. (Presented at the Midyear Meeting, 36th, San Francisco, Calif., May 12-14, 1971.)*

The effect of gasoline composition on the composition of vehicle emissions is discussed without particular regard to the contribution of these emissions to air pollution. The present controversy is to a large extent centered about the effect of increasing aromatic content of gasoline on exhaust emissions. Some of the complexities of this subject include problems of sampling and analysis and the fact that a large percentage of the exhaust hydrocarbons are not found in the original gasoline but are actually manufactured in the gasoline. The significance of combustion versus fuel-derived hydrocarbons in automobile exhaust is even more difficult to interpret when one considers the effect of exhaust control systems on their relative proportions. Combustion-derived olefins, including many of the most reactive hydrocarbons, decrease as aromatics increase. However, the total fuel-derived hydrocarbons remain constant with changing the percent of aromatics in fuel.

15559 APTIC NO. 33745

Striefler, Paul

ELECTRO CITY BUS WITH HYBRID DRIVE. *(Elektrostadtomnibus mit Hybridantrieb). Text in German. Staedtehygiene (Uelzen/Hamburg), 22(10):237-242, Oct. 1971. 8 refs.*

City areas which are heavily polluted by exhaust gas emission can soon turn to the battery-operated bus for public transportation. In the suburbs where air pollution is much lower, the buses can draw the necessary power from the combustion of fuel. A hybrid drive will give the bus a long enough operating span of four hours with a two-ton lead or steel battery. This will require an operation of the 80 to 100 HP charging unit during 50% of the total driving time, e.g., at a path length of 20 km in one direction, 10 km are covered emission-free by battery drive; at the two terminals of the line, a path of 5 km will have to be covered with switched-on power generation. A bus operating on this principle has been developed. The installed power lies between 20 and 70 km/hr 115 kW. The dc motor drives the rear axis. The lead battery has 189 cells yielding an operating voltage of 380 volts. Buses with hybrid drive will cost about 30% more than the conentional diesel engine buses. The ac power generator can be driven by a four or six cylinder diesel engine of 40 to 100 HP. The engine runs with a constant number of revolutions in an emission-low range.

15560 APTIC NO. 34177

Struth, Bert W.

THE IMPACT OF NEW GASOLINE SPECIFICATIONS ON REFINERIES OF THE FUTURE. *Preprint, American Inst. of Chemical Engineers, New York, 26p., 1971. (Presented at the American Institute of Chemical Engineers, National Meeting, 68th, Houston, Tex., Feb. 28-March 4, 1971.)*

Normal growth, a changing natural resources picture, obsolescence, and pollution control will result in refinery expansion of over 10 billion dollars over the next decade. The refinery processing resulting from anticipated changes in gasoline specifications due to pollution control regulations is discussed. The major question facing the industry is how to replace the leaded octane numbers. Advantages and disadvantages connected with catalytic cracking, alkylation, hydrocrackling, residuum upgrading processes, and catalytic reforming are considered, as well as the supply/demand balance. Future trends are cited. Isopentane separation from the light straight run, followed by isomerization of the normals, appears to be the first step in upgrading the low-octane naphthas. The carbon-6 to carbon-9 aromatics are by far the most economically available hydrocarbons. The feed for catalytic reformers will change drastically. Next to aromatics, alkylate made of isobutane and C2 to C5 olefins offers the refiner the next highest research octane value component. The effect of lead removal is discussed.

15561 APTIC NO. 33719

Stueckrad Joachim and Ulrich Dorstewitz

WHAT DO WE HAVE TO EXPECT? (Was kommt auf uns zu)? Text in German. Umwelt (Duesseldorf), 1(5):35-42, Oct./Nov. 1971. 6 refs.

Most of the pollutants in our atmosphere stem from vehicles, industries, homes, and small businesses. About 20.5 million tons of pollutants were emitted in the year 1970, of which 60% came from the automobiles. This becomes plausible when it is considered that an automobile emits 0.14 to 5.6 cu m of exhaust gas each minute depending on the stroke volume. At the combustion of a fuel quantity of 1000 l, 360 kg carbon monoxide develop, 24 to 28 kg hydrocarbons, 6 to 8 kg oxides of nitrogen, 0.6 to 1.2 kg sulfur compounds, 36g dusts, and other pollutants. Diesel engines and airplanes emit considerably less pollutants than the Otto engines. The most important polluters in the industrial sector are the power plants with 14% of the total pollution, followed by the chemical industry metallurgical plants, coke ovens, incinerators, and the cement industry. The emissions by domestic heating systems are remarkable. Coal-fired heaters emit sulfur dioxide and soot, oil-fired emit odorous gases. Of all the pollutants, CO makes up the largest portion, dusts make up 20%. The anti-pollution measures have gaps, e.g., maximum allowable emission concentrations have not been set up for all pollutants, the study of the synergetic effects is still at the very beginning.

15562 APTIC NO. 34214

Subba Rao, G. V.

FUTURE WORLD ELECTRICITY NEEDS. *International Atomic Energy Agency, Vienna (Austria) and Atomic Energy Commission, Washington, D. C., Symp. Environ. Aspects Nucl. Power Stations, New York, 1970, p. 45-56. 4 refs. (Aug. 10-14.)*

Global electricity needs in 1980, as well as the respective needs of developed, centrally planned, and developing countries, are projected according to assumed rates of growth of income and population. The projections are based on cross-section data and time-series data. In general, cross-sectional analysis was used to establish long-term relationships between electric consumption and income, population, industrialization, and urbanization. Time-series analysis was employed to estimate the short-term influence of technical change. The estimates of 1980 range from 8416 TWh to 12,624 TWh, with a mean estimate of around 10,520 TWh. Profound technical changes in all sectors could greatly increase the demand for electricity, making the projections under-estimates.

15563 APTIC NO. 33464

Sussman, Victor H.

NONMETALLIC MINERAL PRODUCTS INDUSTRIES. *In: Air Pollution. Arthur C. Stern (ed.), Vol. 3, 2nd ed., New York, Academic Press, 1968, Chapt. 35, p. 123-142. 45 refs.*

Many air pollution problems associated with mineral processing are caused by overloading or not operating process equipment at design capacity. Also, the importance of good plant housekeeping cannot be overstressed. Overloading kilns, dryers, and furnaces results in higher gas velocities which tend to pick up more dust and overload collectors. Many air pollution problems can be abated or substantially reduced by modifying operations: changing techniques and material handling procedures; providing for proper equipment maintenance (hopper clean-out, enclosure and duct-work repair); and insuring clean roadways, enclosed storage piles, and vacuum sweeping systems. In selecting dust collectors, it is important to consider the size consistency and other characteristics of the collected dust. The size consistency is usually the most important factor in determining if recovered mineral dust can be reintroduced into the process or directly become a salable product. The proper selection and arrangement of collectors (often placing two or three types in series to fractionate the dust stream) will often permit recovery of some of the dust in a usable form. Coal preparation, cement production, asphaltic concrete, concrete batching, glass and ceramics manufacturing, and asbestos processing are discussed. (Author conclusions modified)

15564 APTIC NO. 33368

Tanaka, M., Y. Kobayashi, and S. Yoshizawa

INDOOR AIR POLLUTION DUE TO DOMESTIC GAS-RANGE. *(Gasu konro ni yoru shitsunai kuki osen). Text in Japanese. Kuki Seijo (Clean Air - J. Japan Air Cleaning Assoc., Tokyo), 9(2):28-38, Aug. 1971. 4 refs.*

Combustion experiments were carried out using an ordinary gas range in an air-tight room of 21.9 cu m, and measurements of oxygen, carbon monoxide, carbon dioxide, temperature, humidity, gas consumption, and gas pressure were taken. Oxygen concentration was measured by a magnetic oxygen analyzer; CO and CO2 were continuously measured by an infrared gas analyzer. The CO concentration varied greatly by the air supply to the range and by the use of pots and pans over the range. In general, when utensils were placed over the gas range, CO concentration was greater than when there was nothing over the flames. When air holes were closed completely, CO concentration was higher than when holes were completely open, and when they were half open, the CO value was medial. When gas consumption was greater, CO concentration was high. The CO concentration rate increased with the decrease of oxygen in the room; when oxygen concentration decreased to 20% or less, CO ratio increased drastically. Average natural ventilation of a room per hour is 0.5 in a normal concrete building and 0.25 in a precision construction of concrete, while a normal wooden building has 1.5 to 2 times per hour natural ventilation. The relationship between ventilation and CO concentration varies greatly with the size of the room, but in general, an artificial ventilation device is necessary in a concrete building.

15565 APTIC NO. 34285

Volodin, N. L., F. B. Vurzel, L. S. Polak, Yu. I. Shmykov, and P. N. Endyuskin

FORMATION OF ACETYLENE AND HYDROGEN CHLORIDE IN THE PYROLYSIS OF CHLORINATED HYDROCARBONS IN A HYDROGEN PLASMA JET. *(Polucheniye atsetilena i khloristogo vodoroda putem piroliza khloruglevodorodov v plazmennoy struye). Text in Russian. Khim. Vysokikh Energiy, 5(4):302-307, 1971. 9 refs.*

The thermodynamic calculations of pyrolysis of chlorinated hydrocarbons at 1000-1800 K showed products of acetylene, hydrogen chloride, ethylene, propylene, and methane at 1000-1300 K, and equal amounts of acetylene and HCl at 1500-1800 K. The pyrolysis of dichloroethane, tetiary butylchloride, and nontoxic isomers of hexachloran in a hydrogen jet plasma was studied experimentally. In dichloroethane pyrolysis, acetylene content was 17%; in tertiary butylchloride pyrolysis, it was 20%. The energy consumption was 1.3 and 3.0 kilowatt-hour/kg of dichloroethane plus HCl and of tertiary butylchloride plus HCl, respectively. Isomers of hexachloran and chlorinated hydrocarbons in a hydrogen plasma jet can produce acetylene and HCl by pyrolysis.

15566 APTIC NO. 33697

Wahneschaffe, E.

A STUDY OF THE CONVERSION OF SO2 TO SO3. *(Ein Beitrag zur Umwandlung von SO2 zu SO3). Text in German. Mitt. Ver. Grosskesselbetr., 51(5):385-390, Oct. 1971. 11 refs. (Presented at the Vereinigung der Grosskesselbetreiber, Fachtagung, Emissionen 1971, Hannover, West Germany, Feb. 19, 1971, Munich, West Germany, March 5, 1971, and Essen, West Germany, March 19, 1971.)*

The conversion of sulfur dioxide to sulfur trioxide during the combustion of sulfur-containing fuels and subsequent reactions with other components of waste gases in the boiler are examined. The combustion of fuel oils and other fuels produces carbon dioxide, carbon monoxide, SO3, SO2, nitrogen, oxygen, and nitrogen oxides. The nitrogen oxide (nitrogen dioxide and nitric oxide) concentration increases with increasing boiler load. Between 600 and 900 C, the 10% increase of the SO3 content is due to a direct reaction between SO2 and NO2. Between 300 and 600 C, volatile nitrogen-sulfur compounds develop, liberating SO2 from SO3; the compounds leave with the other waste gas components without condensation. The temperature range below 300 C is characterized by an increase in SO3 concentration, directly correlated with the NO2 content of the flue gas. The conversion of SO2 outside the stacks is largely dependent on the presence and concentration of NOx in the waste gases; the conversion of NO to NO2 determines the speed of the reactions.

15567 APTIC NO. 33383

Wanner, H. U.

INDOOR POLLUTION BY MICROORGANISM. *(Mikrobielle Verunreinigungen der Raumluft). Text in German. Chem. Rundschau (Solothurn), 24(40):995-997, Oct. 1971. 14 refs.*

Microorganisms in the outdoor atmosphere may be the cause of allergies or the spread of plant diseases. Approximately 100-300 bacteria and fungi/cu m of air have been counted in rural areas, while concentrations between 500 and several thousand have been measured in cities. Air conditioning systems may bring microorganisms inside. Impingement or impaction methods may be used for measuring bacteria concentrations. The germs are caught in a liquid or solid nutritive substance. A split-sampler impaction device will also determine the temporal distribution of the microorganism concentration.

15568 APTIC NO. 33762

Weber, Helmut

ANNUAL SURVEY UNALLOYED AND ALLOYED AND LOW-ALLOYED CAST STEEL (EIGHTH SUCCESSION). *(Jahresuebersicht Unlegierter und niedriglegierter Stahlguss (8. Folge)). Text in German. Giesserei (Duesseldorf), 58(20):624-633, Oct. 1971. 96 refs.*

Smokeless refining has gained great importance for smaller foundries since costly dust collectors can be avoided. Oxides of iron, or if the composition of the melt permits it, of nickel oxide and molybdenum oxide can be injected with a pressurized air jet thus avoiding the development of dust. The brown smoke which arises at the oxygen lancing of the melt consists primarily of iron oxides with a particle size of less than five micron of which a sizeable portion is below one micron. For fume and smoke the maximum allowable emission is 115 mg/cu m; for dust between 1 and 76 micron and for grit with a particle size of more than 76 micron, the maximum allowable emission is 460 mg/cu m. If the reactions leading to the development of brown smoke are known, refining methods which avoid it can be used. Considerable smoke reduction can be achieved by mixing the oxygen with steam. Fast and smokeless refining is feasible by using oxygen oil burners.

15569 APTIC NO. 33983

Wilson, Donald F. and Bjorn F. Hrutfiord

SEKOR IV. FORMATION OF VOLATILE ORGANIC COMPOUNDS IN THE KRAFT PULPING PROCESS. *Tappi, 54(7):1094-1098, July 1971. 36 refs. (Presented at the Technical Association of the Pulp and Paper Industry, Annual Meeting, 56th, New York, Feb. 22-25, 1971.)*

The formation of steam volatile organic compounds in the kraft pulping process other than the recovery furnace is reviewed. Reaction mechanisms for the formation of hydrocarbons, sulfur compounds, alcohols, and terpenes are determined. The route to the formation of methyl ketones was established as air oxidation of extractives followed by hydroperoxide decomposition to unsaturated ketones which undergo a reversed aldol condensation in the kraft digester. Fermentation was proposed to account for the formation of all the alcohols except methanol. Guaiacol and related phenolic compounds were determined of importance in overall kraft mill odor. (Author summary modified)

15570 APTIC NO. 34174

Wright, J. H.

POWER AND THE ENVIRONMENT. *Preprint, Northwest Public Power Assoc., 14p., 1970. (Presented at the Northwest Public Power Association Symposium, Seattle, Wash., Nov. 12, 1970.)*

Of the two principal types of steam electric generation plants (fossil and nuclear), both emit to the environment small quantities of radioactivity and large quantities of low grade heat. In addition, the fossil plant emits quantities of sulfur and nitrogen oxides and particulate matter. Radiation sickness, mutant strains, and induced carcinomas may result from large quantities of radiation. Heat discharged from a power plant may interact synergistically with impurities in water to cause major environmental stress. Sulfur dioxide causes plant damage and respiratory tract stress in animals. However, electric power has many advantages in transportation, process heat, and space heating.

15571 APTIC NO. 34101

Yanagihara, Shigeru

TWO-CYCLE GASOLINE ENGINE EXHAUST GASES. *(2-Saikura gasorin kikan no haiki gasu). Sangyo Kogai (Ind. Public Nuisance), 4(11):683-690, 1966. Translated from Japanese. Translation Consultants, Ltd., Arlington, Va., 20p.*

At the present time, two-cycle gasoline engines are clearly less advantageous than four-cycle engines principally because their exhaust gases contain large quantities of emitted hydrocarbons. In some ways, however, two-cycle engines are mechanically superior. The construction and characteristics of two-cycle engines are discussed, as well as exhaust gas composition, afterburners, and fuel injection. As a general rule, it is possible to sustain a flame reaction throughout all operating limits including lean air-fuel ratios, if the temperature of the reactants is kepy high by utilizing a heat exchanger.

15572 APTIC NO. 33836

Yeaple, F. D.

ELECTRIC MOTOR-ENGINE HYBRIDS GET NOD FROM ENGINEERS AND ECOLOGISTS. *Prod. Eng., 42(16)43-47, Nov. 1971.*

Several vehicle prototypes have been built with engines that run continually at more or less optimum load, in conjunction with a battery-electrical-mechanical system that absorbs and stores excess engine energy and augments or substitutes for engine power when needed. One hybrid power train consisted of heat engine, batteries, generator, and electric motor. The near-future electrics will get rid of bulk in two ways: a lightweight light-speed electric motor, running at its best range of speed, will be the prime mover; and an infinitely-variable mechanical transmission such as a metal-to-metal rolling-traction drive will smoothly and efficiently convert the high speed of the motor into the low speed of the drive shaft. Superflywheels, engine backup, and hydrogen ecology are discussed.

15573 APTIC NO. 33668

Yoshihara, Kazunori and Tsugio Abe

STUDIES ON AUTOMOTIVE EXHAUST GAS BY SIMULATED OPERATING ENGINES. *(Soko simureto enjin jikken ni yoru jidosha haishutsu gasu no kenkyu). Text in Japanese. Preprint, the Society of Automotive Engineers of Japan, Inc., Tokyo, p. 105-116, May 1971. (Presented at the Society of Automotive Engineers of Japan, Academic Conference, Tokyo, Japan, May, 1971.*

A simulated operating engine was constructed for the purpose of analyzing exhaust gas emission distribution patterns and control methods. The apparatus consisted of: a dynamometer and control meter centering upon the power absorption area; a simulating operation control meter centering upon engine control; meters treating exchangers and measurement data; and a central control section which coordinates each control section organically. Resistance of the motor during the car operation was mechanically reproduced by quantitative determination by a differential equation applied on inertia board. The engine control and the motor correctional control were related and an independent and unique control method was developed by an alternate use of automatic and gear shifts in combination. The mechanism of each part of the apparatus was discussed in detail. The offline method was used for an electronic computer treatment of data.

15574 APTIC NO. 33797

Zaugol nikov, S. D., M. M. Kochanov, and A. O. Loit

ORGANIZATION OF INVESTIGATIONS FOR HYGIENIC ASSESSMENT OF ATMOSPHERIC POLLUTIONS. *(Voprosy organizatsii issledovaniy po gigienicheskoy otsenke atmosfernykh zagraznenij). Text in Russian. Gigiena i Sanit., 36(6):88-91, 1971. 25 refs.*

Some methodical and organizational problems are considered which affect the hygienic assessment of atmospheric pollution. Pollution sources, temperature of emissions, and velocity of polluting particles must be determined. Diffusion of pollutants under varying meteorological conditions must be studied. The hygienic assessment of atmospheric pollution should be preceeded by an analysis of all factors effecting atmospheric diffusion. Many observations should be used. The collected sample must be considered with reference to the background concentration of the pollutant. Mathematical and statistical methods are quite useful.

15575 APTIC NO. 33798

Zoller, W. H., G. E. Gordon, E. S. Gladney, and A. G. Jones

THE SOURCES AND DISTRIBUTION OF VANADIUM IN THE ATMOSPHERE. *Am. Chem. Soc. Div. Water Waste Chem., Gen. Pap., 11(2):159-165, 1971. 18 refs. (Presented at the American Chemical Society, Division of Water, Air and Waste Chemistry, National Meeting, 162nd Washington, D. C., Sept. 12-17, 1971.)*

Atmospheric concentrations of vanadium can be measured quite well by the use of lithium-drifted germanium gamma-ray detectors in neutron activation analysis. The two largest potential natural sources of atmospheric vanadium are the oceans and continental land masses. Crustal weathering is another source of vanadium that must be considered. The vanadium content of granite is about 16 ppm and it is about 240 ppm for diabase. Evidence is cited for residual oil being the major source for vanadium in Boston. An effect of vanadium which has been noticed is that involving its catalytic properties with regard to the oxidation of sulfur dioxide to sulfur trioxide in the emissions from combustion sources. The result in the presence of water vapor is the formation of acid smut.

CONTROL METHODS

15576 APTIC NO. 33321

REFUSE CASO4 FROM FLUE GASES DESULFURIZATION IN COAL POWER PLANTS. *(Odpadni siran vapenaty z odsirovani spalin tepelnych elektraren). Text in Czech. Stavivo, 43(11):413, 1965. 1 ref.*

A method of flue gas desulfurization from coal power plants by ammonia is described, in which 90% of the sulfur dioxide is absorbed. Ammonia is recovered by lime during the formation of a dehydrate of calcium sulfate of high purity. The purity increases if lime milk is used instead of lime. About 80% of the ammonia is recovered. The process of ammonia regeneration is cheap and simple.

15577 APTIC NO. 33328

GAS DESULFURIZATION AND SULFUR RECOVERY METHODS. *(La desulfurization du gaz et les procedes de recuperation du soufre). Text in French. Schweiz. Ver. Gas- Wasserfachmaennern Monatsbull. (Zurich), 21(2):26-30, 41-42, 1941.*

Gas desulfurization and sulfur recovery methods introduced and employed during the past 25 years are reviewed. The dry gas desulfurization process passes gas through a purification layer containing limonite or iron oxide in some other form which reacts with the hydrogen sulfide, yielding iron trisulfide. Regeneration is achieved by oxygen and steam to yield sulfur. Both equipment and composition of the purification mass are perfected; from 1 ton Belgian coal about 1.5 kg sulfur can be recovered by the dry process. The Lurgi process converts the saturated purification mass into SO2 which is subsequently oxidized to SO3 and converted to sulfuric acid in lead chambers by means of a vanadium oxide catalyst. This method is suitable for gas mixtures containing less than 10% H2S and reclaims 98% of the sulfur in the form of oleum. Sulfur from the purification mass can be extracted by solvents like petrolether, light tar oil or trichlorethylene; however, tar is also extracted simultaneously and is difficult to separate from the sulfur. Sulfur can also be extracted by fusion or evaporation by heating under pressure in the presence of a soap solution. A recent German process extracts sulfur by solvents (carbon disulfide) under pressure of from 5 to 15 atm. Gaseous hydrogen sulfide with added air can be absorbed by activated carbon and catalytically oxidized to sulfur. The sulfur is reclaimed from the activated carbon by solvents. One cu m activated carbon will purify 6000 cu m gas in 24 hours. The recovered sulfur is very pure. The process is feasible only on a very large scale for gas containing less than 5g cu m H2S.

15578 APTIC NO. 33440

PROCESS OF NEUTRALIZING FUMES ORIGINATING FROM THE COMBUSTION OF COMBUSTIBLES CONTAINING SULFUR. *(Procede de neutralisation des fumees provenant de la combustion de combustibles contenant du soufre). Text in French. (Solvay et Cie (Belgium) French Pat. 1,539,777. 3p., Aug. 12, 1968. (Appl. July 12, 1967, 6 claims).*

During the burning of solid, liquid, or gaseous combustibles containing sulfur fumes form which can be neutralized by calcium carbonate or magnesium carbonate. These substances are employed in pulverized form, with particle sizes of less than five micron. The particles are enveloped in an organic coating, such as stearic acid, or a salt of this acid. The neutralizing material is injected into the combustion chamber at the burners, the typical procedure during oil firing. When using gaseous combustibles or finely pulverized coal, the neutralizer can be injected into the combustion air or into the fuel itself. Furthermore, the calcium carbonate can also be employed in the form of a concentrated suspension in a combustible liquid, to be injected into the fuel line or into the combustion chamber. One of the effects of the neutralizer is to lower the dew point of the combustion fumes and consequently their corrosive properties by counteracting the formation of sulfuric acid through condensation when in contact with relatively cold surfaces. As an example of the effectiveness of a calcium carbonate neutralizer enveloped in stearic acid, injection of a neutralizer of 0.17 micron particle size resulted in a combustion product having a pH of 9.5.

15579 APTIC NO. 33573

Japan Air Cleaning Assoc.

STUDIES ON THE EQUIPMENT FOR AIR PURIFICATION IN POLLUTED URBAN DISTRICT. *(Toshi kogai* *chiku ni okeru kuki seijo sochi ni kansuru kenkyu). Text in Japanese. 22p., March 1968.*

Measurements were carried out at seven points in a Tokyo building to examine the influence of harmful gases from inside and outside on the indoor environment and the effectiveness of air purification equipment. Items investigated were concentrations of sulfur dioxide, carbon monoxide, and hydrocarbons, as well as suspended dusts, in rooms with and without activated carbon filters, and the effects of number of persons and smoking on air quality. Even in a room without a filter, SO2 was one-fifth the outdoor concentration due to adsorption by building materials. The activated carbon filters were highly effective in eliminating SO2 but not demonstratively effective with CO and hydrocarbons. Smoking caused CO concentration in a room to be about 10 ppm higher than outdoors. Attempts to calculate the rate of elimination of harmful gases by a filter were unsuccessful, but a correlative formula between amount of dust (M equals O.D. times 1000 cu m/s) and number of persons in a room (n) was obtained: M equals 0.5n. Useful information for filter design was also obtained, such as rate of SO2 passage through filter and duct and adsorption of SO2. However, filter development requires basic research on CO, hydrocarbons, and offensive odors.

15580 APTIC NO. 33580

Fuji Electrical Manufacturing Ltd. (Japan)

PROTECTION AGAINST AIR POLLUTION AND LATEST PROGRESS IN AIR FILTER. *(Saikin no kuki seijo sochi to bojin taisaku). Text in Japanese. Fuji Jiho (Fuji Elec. J.), 43(9):28-38, 1971.*

Mechanisms of room air pollution, changes of dust concentration in a room, and control methods are discussed with the use of equations. For control of indoor dust and transport of pollutants, the following are suggested: improvement of inhabitants and visitors awareness, change of footgear, use of dust free work coats and hats, limitation of the number of people per room, isolation of dust-producing operations, prevention of dust dispersion by local ventilation, installation of an air shower and a dust-control room, and selection of building structure material. Conditions and control methods of industrial environments, where cleanliness and dust-free conditions are imperative, are discussed, including industries and institutions dealing with semi-conductors, optics, electronic computers and appliances, precision machinery and clockworks, pharmaceuticals and medicine, hospitals, and food and beverages. Various types and makes of air cleaning apparatus, their mechanism, efficiency, applicability, and evaluation are presented.

15581 APTIC NO. 33628

THE PROBLEMS INVOLVED IN THE NEW LAW FOR REDUCTION OF THE LEAD CONTENT IN GASOLINES. *(Zur Problematik des Benzinbleigesetzes). Text in German. Erdoel Kohle (Hamburg), 24(9):605-606, Sept. 1971. 13 refs.*

Beginning in 1971, the lead content in gasolines sold in West Germany may not go over 0.4 g/l, while by 1976 the reduction is to be to 0.15 g/l. Although the lower lead content will reduce the octane number, this should not affect engine performance. However, it is actually thought that the government acted without having conducted a sufficient number of studies concerning the effects of lead on the environment. It is also thought that engine modifications will need be made to operate on the low-lead gasolines. A reduction of the lead content to 0.15 g/l might cause a rise in aromatic compounds which are more dangerous to human health than lead compounds. It is also likely that a lead filter will soon be on the market, thus producing an effect similar to the use of low-lead gasolines.

15582 APTIC NO. 33635

HIGH TEMPERATURE HEAT EXCHANGERS AID IN POLLUTION CONTROL. *Nickel Topics, 24(4):13, 1971.*

Recuperators with heat exchange surfaces of nickel stainless steel can reduce the temperature of exhaust gases to a point where they may be filtered through fabric bags. In this way, most of the particulate matter can be removed. Present designs of metallic recuperators are highly efficient and utilize a variety of wrought and cast nickel stainless steels. The most economical materials are a chromium nickel - iron stainless steel for high-temperature sections and a chromium nickel - alloy for temperatures not exceeding 1200 F. When recuperators are used to head incoming combustion air, fuel savings up to 58% are possible, and savings of 30-40% are regularly observed under average air preheat and hot gas temperatures.

15583 APTIC NO. 33657

ENGINE PERFORMANCE WITH LEAD-FREE GASOLINE IMPROVED BY INDUCTION HARDENING OF INTEGRAL VALVE SEATS. *Ind. Heating, 38(9):1650-1652, Sept. 1971.*

Based on the testing experience of one company, induction-hardened valve seats may be the solution to the seat recession problem caused by unleaded gasolines. The seats exhibit 25% of the wear of nonhardened seats and are less expensive to produce than valve seat inserts. Heat transfer impairment is minimal. The induction-hardening equipment is entirely automatic and tied into the head machining line. Each line handles approximately 200-250 heads per hour. The first unit is now going into production.

15584 APTIC NO. 33746

DRAWING OFF, COOLING, DUST COLLECTION AND COMBUSTION OF CONVERTER WASTE GASES. *(Absaugung, Kuehlung, Entstaubung und Verbrennung von Konverterabgasen). Text in German. Wasser Luft Betrieb, 15(10):387, Oct 1971.*

Exhaust systems and dust collection for converter waste gases are new. But they are expensive and space consuming and threaten the profit-oriented operation. In a more economical operation of the waste gas cleaning system, the waste gases are first cooled by means of a waste heat boiler. The blower for drawing of the waste gases and the differential pressure scubber which is used for dust collection are adjusted in a manner so that the converter gases are incompletely burned due to a lack of air. The unburned fraction of the converter waste gas is burned after the dust collection at the end of the stack in a flare.

15585 APTIC NO. 33753

LOW-EXCESS, AIR-FIRING TECHNIQUE TO CUT EFFLUENT FROM LENNOX STACKS. *Elec. News Eng., 80(9):28-31, Sept. 1971.*

Control measures undertaken by Ontario Hydro include installation of 99.5% efficient electrostatic precipitators at its generating stations, tall stacks to promote effluent dispersion, conversion to natural gas at one plant, and construction of an oil-fired generation station. The latter will have two 650-ft stacks and will employ a low-excess air-firing technique successfully used in Europe and Japan. This involves an accurate balancing of fuel, oil, and air, a process that is not possible with coal. Hydro is also studying methods of utilizing waste heat from its giant nuclear plant and an apparatus for removing sulfur dioxide from stack gases by reaction with limestone.

15586 APTIC NO. 33793

SEWAGE SLUDGE BURNED WITHOUT SMOKE OR ODOR. *Public Works, 102(10):72-74, Oct. 1971.*

In San Mateo, California, the city engineers solved the problem of disposing of sewage sludge by installing an incinerator system. A multi-hearth furnace, fueled with natural gas, reduces 25 tons of sludge cake per day to one ton of dry, sterile ash. Long-range plans for the treatment plant include a proposed full secondary treatment system and eventual tertiary system to reclaim wastewater for municipal parks and recreation facilities. Solids and other materials are shredded by two comminutors at the main lift station, and the sewage is then prechlorinated to control odor and reduce BOD and coliforms. The sewage is first pumped into three clarifiers for settling and separation of solids and liquids. Floating grease and skimmings are removed by a surface scraper and gravity-fed into a pit for subsequent pumping to the natural gas sludge incinerator. During the combustion process, all fumes and odors are destroyed thermally.

15587 APTIC NO. 33805

SPECIAL EMISSIONS REPORT: DETROIT DIESEL. *Diesel Equip. Supt., 49(10):44-46, Oct. 1971.*

It is predicted that the engine Detroit Diesel will be selling in 1975 will not require catalytic mufflers, thermal reactors, or special fuel additives to meet emission standards. Since 1959 the division has reduced hydrocarbons by 90% and carbon monoxide by 40%. In addition, smoke has been reduced by about two-thirds and odor concentration is down to only 15% of its previous level. By conducting Clean Air Clinics, Detroit Diesel launched a national campaign to get older engines to quit smoking. Problems with smoke suppressants are cited, while much wider use of the turbocharger is foreseen.

15588 APTIC NO. 33806

SPECIAL EMISSIONS REPORT: CUMMINS. *Diesel Equip. Supt., 49(10):35-37, Oct. 1971.*

In view of the 1975 California emission standards, the Cummins Engine Company predicts that there are many applications where the diesel may become a more advantageous power plant as the lowered performance and additional costs of the gasoline engine become a reality. As the Cummins engineers presently see it, the catalytic muffler is not going to play a role in solving the problem. More extensive use of turbochargers is being planned to control smoke emissions, while engine noise can possibly be eliminated with mufflers and air silencers.

15589 APTIC NO. 33807

SPECIAL EMISSIONS REPORT: CATERPILLAR. *Diesel Equip. Supt., 49(10):31-33, Oct. 1971.*

With the current emphasis on emissions controls, there is a feeling at Caterpillar that the pre-chamber diesel may well emerge as the power plant that does the best all around job. In a pre-chamber engine, combustion is more complete. Fuel is injected into the pre-chamber just before the piston reaches top dead center. The air motion resulting from the compression stroke thoroughly mixes the fuel with the air in the pre-chamber and the heat evaporates the fuel to further aid ignition. After combustion begins, increased temperature, gas expansion, and the resultant increase in pressure forces the burning and partially burned mixture into the main chamber where combustion is completed in a highly turbulent atmosphere.

15590 APTIC NO. 33808

SPECIAL EMISSIONS REPORT: MACK. *Diesel Equip. Supt., 49(10):48-49, Oct. 1971.*

If a Mack truck engine is properly fueled, lubed, timed and, in general, properly maintained, there is no smoke problem. A precombustion chamber and aftercooling are being considered by Mack engineers as two ways to meet the 1975 pollution standards. Add-on devices and smoke suppressants, at the present time, offer more disadvantages than advantages. Although Mack is talking about the turbine and researching it, they plan to go with the diesel very much like today's in 1975.

15591 APTIC NO. 33816

THE INSTALLATION OF HONEYCAT SYSTEMS. *Platinum Metals Rev., 15(4):132-133, Oct. 1971. 2 refs.*

The Honeycat air pollution control system depends on catalytic combustion converting organic vapors, the main cause of most factory smells, to non-smelling and harmless carbon dioxide and water. Effective odor abatement may be obtained with the Honeycat platinized ceramic honeycomb catalyst at operating temperatures of about 50% of those required in direct incineration systems. The system is already being applied in the animal by-products, food manufacturing, and fish meal industries. The critical factors that affect the solving of air pollution problems of this type are the composition, temperature, and volume of the process gas to be treated.

15592 APTIC NO. 33876

(Inventor not given.)

A METHOD OF WASHING FUMES CONTAINING OXIDES OF SULFUR. *(Procede et dispositif de lavage de fumees contenant des composes de soufre a caractere d oxydes). Text in French. (Gottfried Bischoff Bau Kompl. Gasreinigungs- und Wasserrueckkuehlanlagen Kommanditgesellschaft (West Germany) and Steinkohlen-Elektrizitaet AG, Essen (West Germany) French Pat. Appl. 2,005,698. 4p., April 4, (12 claims).*

Fumes containing sulfur dioxide and sulfur trioxide are saturated with steam from a washing liquid consisting essentially of water. The vapors are then condensed in a separator and SO2 and SO3 extracted from the gas into the condensate. Fine, preferably alkaline dust of a particle size of condensation nuclei is added to the washing liquid as well as an alkaline or saline solution which extracts little or no CO2 but absorbs SO2 and SO3. The equipment consists of a washing tower and a condensation tower. The gas enters at the bottom of the tower and the washing liquid with the additives is introduced by a system of rotating nozzles at the top. The condensation apparatus is a venturi tower in which the opening of the annular slit can be regulated. A quantity of supplemental washing liquid is injected into the venturi tower, contributing to an acceleration of the gas through the slit ring and to condensation. The condensate can be recycled to obtain the desired concentration of SO2 and SO3.

15593 APTIC NO. 33896

IMPROVEMENT IN THE TREATMENT OF RESIDUAL GASES. *(Perfectionnement au traitement des gaz residuaires). Text in French. (Simon Carves Ltd., Stockport (England) Belg. Pat. 613,590. 8p., Feb. 28, 1962. (Appl. Feb 2, 1962, 10 claims).*

The subject of this invention is the elimination of sulfur oxides from waste gases, such as flue gases. Earlier known methods resulted in the generation of residual compounds which are difficult to remove and have no commercial value as by-products. Also, with such processes, the washing and cleaning of gases with an aqueous solution caused cooling of the gases and their saturation with water vapor. Upon leaving the chimney, the gases would rapidly sink toward the ground, carrying with them noxious chemical components. With the present invention, a process is applied which allows the cleaned gases to emerge relatively dry. As a washing fluid, an aqueous solution with a 40 to 80% concentration of sulfuric acid, persulfuric acid, and hydrogen peroxide is employed. In the washing tower, the gases to be cleaned enter at the bottom, and in ascending are permeated by the spray of washing fluid descending from above. The used fluid is collected in a reservoir at the bottom of the tower where, it is recirculated to the top of the tower in two branch lines. One line carries part of the fluid directly back to the tower, while the second one takes another part through a cooler and into an electrolytic cell where a supplementary formation of persulfuric acid and hydrogen peroxide takes place before the fluid returns to the top of the tower. A limited supply of fresh water is steadily entering the top where it joins the recirculated fluid. To keep the circuit in balance, a percentage of the circulating fluid is drained off which can be utilized for obtaining saleable sulfuric acid.

15594 APTIC NO. 33907

(Inventor not given.)

PROCESS FOR THE REMOVAL OF NITROGEN OXIDES FROM GASEOUS MIXTURES. *Procede pour enlever les oxydes d azote de melanges gazeux). Text in French. (North American Rockwell Corp.) French Pat. 1,593,279. 26p., July 3, 1970. (Appl. Nov. 20, 1968, 4 claims).*

The method described passes a gaseous mixture containing nitrogen oxide impurities through a mixture of fused salts containing at least 50% by weight of an active absorbent in the form of a mixture of ternary carbonates of lithium, sodium, and potassium, at a temperature between 350 and 500 C. The reaction temperature fluctuates between 400 and 450 C and the composition of the absorbent mixture is 45% $LiCO_3$, 30% Na_2CO_3, and 25% K_2CO_3. Nitrogen oxides are converted by the reaction to nitrites and nitrates of Li, Na, and K. At a temperature between 400 and 600 C, these are subsequently reduced by hydrogen, carbon monoxide, activated carbon, or other carbon-containing reagents to carbonates of Li, Na, and K, which are recycled. Gases resulting from the reaction contain elementary nitrogen. By self-regeneration, the process, when applied to automobile exhaust gases containing both NO and CO, results in a considerable reduction of the NO content of the escaping gas. In this modification the carbonate mixture is solid at prevailing temperature and is fused by the heat generated by the internal combustion engine.

15595 APTIC NO. 33941

Arizona Univ., Tucson

MINERAL RESOURCES AND ATMOSPHERIC RESOURCES. *In: Nonfuel Mineral Resources of the Public Lands. Public Land Law Review Commission Contract 68-C-20, AU Rept. 30, Rept. PLLRC-30-6, p. 674-690, Dec. 1970. 73 refs.*

NTIS: PB 196084

The specific reasons for air conditioning or ventilating mines are several. Most important, ventilation must be undertaken to maintain the oxygen content of the air at a safe level; the U. S. Bureau of Mines recommends that the minimum allowable concentration of oxygen in the exhaust air of a mine is to be 19.5%. Second, ventilation must be adequate to dilute and/or remove harmful gases to keep them below maximum allowable concentrations. The principal gaseous waste products of the nonfuel mineral industries are listed tabularly, including their physical properties, harmful effects, sources, maximum allowable concentrations, and fatal concentrations. Maximum allowable concentrations are also given for dusts. Appropriate ventilation is absolutely necessary to control or contain fires in mines. The most effective measure of controlling atmospheric contaminants in mines involves prevention. This in turn entails the proper adjustment and maintenance of internal combustion engines, and maximum avoidance of open flames and fires. The second major method of treating harmful atmospheric components is by removal. This involves the drainage of harmful gases and local exhaustion by forced ventilation. Harmful components are often eliminated by absorption, but probably the most common method of treating harmful gaseous wastes is by dilution. The prevalence of radioactivity in mines is considered. Most of the adverse atmospheric effects of mineral industrial activity have come from beneficiation and advanced processing operations. The smelting of sulfide ores and the production of elemental phosphorus have been two of the most important real and potential offenders in the West.

15596 APTIC NO. 33970

Hanshin Internal Combustion Engine Industries, Co., Ltd. (Japan)

HANSHIN HJ, A WET-TYPE DUST COLLECTOR. *(Hanshin HJ - gata shisshiki shujin sochi ni tsuite). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 7(10):604-605, Oct. 1971.*

Representative Hanshin wet-type collectors include: venturi scrubbers, water sprays, a mechanical water drop creation, and an aerosol with the water reserve and air jet. The dust collection rate is excellent. The structure is simple and damage is infrequent; wide selection of material is possible because of the simple structure; and maintenance is easy. The dust containing air flows in from the entrance and is injected through a slit type nozzle into water at a high speed. The air-water combination repeatedly collides into baffle boards and creates eddies, colliding, dispersing, and coagulating the air and water in a short period of time. The wet air then passes between the baffle boards and a ridge board and only clean air will reverse its course and go out. Hanshin dust collectors can be used for various types of dust materials such as: minerals, cokes, sinters, lime, foundry pellets, sand, brit blast, tar mist, crushed or broken particles of asphalt, dust from dryers, tiles, ceramic shards, sugar, fertilizer, agricultural chemicals, rubber, cement; they also absorb hydrogen sulfide, hydrocyanic acid gas, chlorine mist, nitrous acid.

15597 APTIC NO. 34016

EFFECTIVENESS OF VARIOUS DESULFURIZATION METHODS OF STACK GAS. *(Kakushu haien datsuryu no koyo). Text in Japanese. Preprint, Japan Industrial Newspaper Co., Tokyo, 6p, 1971. (Presented at the Seminar on Air Pollution Control, Tokyo, Japan, Sept. 1971.)*

A small desulfurization system was enlarged with consideration for following problems which often occur when a small system is magnified: lowering of desulfurization ratio, irregular particle sizes of soot and dusts, an increase of power loss by dusts, a drastic decrease of the reaction rate, instability of operation from the dust accumulation in parts of the absorption tower, the decrease of absorption rate from clogging, larger floor space for large cyclones, a larger load variance for the furnace, and flexibility for the air supply ratio. In order to minimize the liquid layer membrane resistance and to increase the liquid-gas contact surface, the thickness of the liquid layer must be minimized and the liquid surface must be moved as much as possible. A small mesh net covered the liquid for this purpose. A cross current contact with a device for constantly changing the gas flow speed and liquid quantity was used in the absorption tower. This sytem does not try to recover sulfur dioxide in the stack gas, but to eliminate it. Sea water is used as absorbent, utilizing the large quantity of free alkali in it to minimize the use of the alkaline additive. The sulfur dioxide salt oxidation speed is relatively fast and the treatment of pH and chemical oxygen demand before discharging the waste liquid is relatively easy. All in all, the cost of operation is much less than the recovery system of SO_2.

15598 APTIC NO. 34061

CLOSED CYCLE STEAM ENGINE. *Automobile Engr., 61(1):15, Jan. 1971.*

A Rankine-cycle steam engine with a closed cycle will be developed to reduce exhaust emission. By using a closed cycle operating on an organic working fluid, an efficient and reasonably compact power unit can be obtained. Thiophene, which has a freezing point of minus 40 C, is the working fluid. The boiler is of tubular construction, but the thiophene passes the inner of two concentric tubes. Between the inner and outer tubes, the annular space is partially filled with water. Heat at the saturation temperature of water, at the pressure maintained in the annular space, is transferred to the inner tube and thence to the thiophene. Brief estimated performance data for a car equipped with a suitable steam engine are tabulated.

15599 APTIC NO. 34065

EXHAUST GAS AS REQUIRED BY 1974. *(Abgas wie 1974 vorgeschrieben). Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), 25(39):27, Sept. 1971.*

The regulations concerning exhaust gas composition which will go into effect in 1974 are met by the reactor developed for the

NSU Ro80. The reactor is the main component of the exhaust system. The most important accessory is the air pump which supplies dosed amounts of air to the exhaust gas ducts of the engine casing. A number of switches and underpressure units control ignition in all operating modes from idling to full load. Ignition can be delayed or accelerated, depending on the need. At cold start, ignition is delayed for 13 min until the operating temperature is reached. Ignition timing in city traffic depends on the rpm: it is delayed until about 2900 rpm/min, i.e., until a speed of about 55 km/hr is reached.

15600 APTIC NO. 34110

(Inventor not given.)

DEVICE FOR REDUCING THE EXHAUST SMOKE OF AN INTERNAL COMBUSTION ENGINE. *(Automobiles M. Berliet, Lyon (France)) Brit. Pat. 1,147,474. 3p., April 2, 1969. (Appl. Sept. 28, 1966, 2 claims).*

A device is described which reduces the smoke emitted by an internal combustion engine during rapid acceleration. The flow-rate of fuel injected into the combustion chamber is usually fixed by the position of a rack in the injection pump. During a transition from the idling to the full-load position, the rack violently projects toward the full-load position, overshoots, and passes into the overload zone. The engine then receives more fuel than is necessary. This fuel, incompletely burned, is converted into soot and thus causes smoke in the engine exhaust. The device described is movable beyond a full-load position to an overload position for use during starting. It has a pneumatic damping device which consists of a cylinder and piston. These form a chamber with a braking valve which has an air inlet and an air outlet. The air outlet has a smaller cross section than the inlet. The chamber includes a spring for returning the piston to the full-load position.

15601 APTIC NO. 34111

(Inventor not given.)

REMOVAL OF ACID GASES FROM GASEOUS MIXTURES. *(Shell International Res. Co., The Hague) Brit. Pat. 1,153,786. 4p., May 29, 1969. (Appl. Sept. 22, 1967, 11 claims).*

An absorption process is described for treating natural gas, refinery gases, or flue gases containing a high proportion of acid gases such as hydrogen sulfide and carbon dioxide. The gaseous mixture is contacted with a liquid absorbent consisting of an amino ether and selective solvent. The absorbent should also contain 1-15% wt. water. The absorption is conducted under rectified absorber conditions at a temperature of 25 to 135 C. The temperature at the bottom of the absorber column is 20 to 85 C higher than that at the top of the absorption zone. The fat absorbent solution, containing dissolved H2S, CO2, and possibly hydrocarbons, is regenerated by stripping at 112 to 190 C. These low stripping temperatures are possible because of the presence of water in the absorbent.

15602 APTIC NO. 33584

Akamatsu, Yoshio, Masahiro Maruo, Masao Hirashima, and Sadaaki Ae

LOCAL HEAT-SUPPLYING FACILITIES COMBINED WITH URBAN WASTES INCINERATORS FOR MORINOMIYA AREA, OSAKA. *(Toshi gomi shokyakuro ni yoru osaki-shi morinomiya chiiki kyunetsu setsubi). Text in Japanese. Kuki Chowa Eisei Kogaku (J. Japan Soc. Heating, Air-Conditioning Sanitary Engrs.), 45(8):17-35, Aug. 1971. 7 refs.*

Since 1969, a plant has been operating usccessfully in Morinomiya, Japan, which combines an incinerator for the disposal of urban wastes with local heat-supplying facilities. Specifications of the plant are described, as well as the following equipment: an incinerator garbage feeder, three stokers, a heavy oil burning device, ventilation equipment, crushers and cranes, ash removal apparatus, excess heat boiler facilities, preheaters, a steam condenser, boiler water supply device, multi-cyclone and electric dust collectors, pumps and tanks, and air ducts and stacks. The local heat source is a hot water plant which generates steam at a pressure of 13.5 atm at 230 C.

15603 APTIC NO. 33968

Ando, Takashi

POWER SOURCES OF ELECTROSTATIC PRECIPITATORS -- PRINCIPLES, PERFORMANCE, OPERATION, AND MAINTENANCE. *(Denki shujinki no dengen sochi -- genri, seino, unten, hoshu). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 7(10):606-608, Oct. 1971.*

Power sources of electrostatic precipitators are discussed with regard to power generation, supply of high voltage direct current, voltage control, spark discharge control, elimination of glow arc, automatic disruption (trip), operation, inspection, adjustment, maintenance, repair, and evaluation of a power source system. Criteria for a good power source includes: the followup from the spark discharge to voltage, the range of electric load adjustment, the intensity of spark rush current, the duration of spark power off, the glow arc elimination efficiency, the voltage current wave rate, operational efficiency, reliablility, and protective by-pass. The external shape, measurements, weight, and environmental temperature (less than 40 C) must be satisfactory, operation must be automatic, and damages and repair should be simpl to deal with.

15604 APTIC NO. 33387

Attane, E. C., D. E. Mears, and B. J. Young

UNIONFINING: A GENERAL PURPOSE MODERN HYDROTREATING PROCESS. *Proc. Am. Petrol. Inst., Div. Refining, vol. 51:89-95, 1971. 7 refs. (Presented at the American Petroleum Institute, Division of Refining, Midyear Meeting, 36th, San Francisco, Calif., May 12-14, 1971.)*

A versatile hydrotreating process combining the latest improvements in catalyst and process design with the proven technology previously available was developed. Its applications include a wide variety of feedstocks, both cracked and straight run. Naphtha feeds to sulfur-sensitive bimetallic reforming catalysts are consistently pretreated to less than one ppm sulfur. High nitrogen and refractory cracked feedstocks can now be processed at moderately severe conditions. Other successful applications include treatment of wide-range feedstocks (distillate oils), catalytic cycle oils, and coal tar naphthalenes. In each case, the Unionfining process provides long catalyst life, low operating costs, and high reliability. (Author abstract)

15605 APTIC NO. 33662

Aureille, R. and P. Blanchot

EXPERIMENTAL STUDIES OF THE INFLUENCE OF VARIOUS PARAMETERS ON THE EFFICIENCY OF AN ELECTROSTATIC PRECIPITATOR. *(Experimentalle Untersuchung des Einflusses verschiedener Parameter auf den Wirkungsgrad eines Elektrofilters). Text in German. Staub, Reinhaltung Luft, 31(9):371-375, Sept. 1971. 3 refs.*

An investigation was carried out to determine the parameters which affect the efficiency of electrostatic precipitators. A semi-industrial pilot plant was built in which a homogeneous mixture of cold air and fly ash from a power station was used as the waste gas. The migration velocity changed considerably, when the shape of emission electrodes, the gap between electrodes of different polarities, or the inlet concentration distribution was altered. This was apart from the familiar parameters such as gas velocity and relative humidity which are known to have an effect on precipitator performance.

15606 APTIC NO. 33854

Bachmair, Anton

REPORT ON LECTURE GROUP F OF THE CONGRESS REINHALTUNG DER LUFT 1969. *Staub (English translation from German of: Staub, Reinhaltung Luft), 30(2):26-35, Feb. 1970. 18 refs.*

NTIS: TT 70-50047/2

Summaries are presented of lectures on odors, waste incineration, and domestic fuels. Odors are reduced by thermal waste-gas purification, catalytic waste-gas purification, and chemical oxidation; data is included on the efficiency of these processes as used in the food industry. The state of the art of reducing emissions from waste incineration is described, and regulations covering large and small incinerator plants are noted. Smaller plants use primarily mechanical separators; large plants, electrostatic precipitators. Proposed processes for removing sulfur dioxide from smoke are not yet suitable for practical use in waste incineration. With the increased use of gas and electricity, emission of solid matter from domestic furnaces will drop by approximately 50% in the next 10 years, but SO2 emissions will increase with the increased use of oil for domestic furnaces. Five processes for producing fuels which emit little smoke are described: the Inichar-sand-bed furnace process, the alkali briquette-making process, the BF-sanding coking processes for smoldering anthracite briquettes and coal pellets, and the hot briquette-making process.

15607 APTIC NO. 34278

Baddams, H. W.

INDUSTRIAL COMBUSTION OF OIL FUELS. *Clean Air (J. Clean Air Soc. Australia New Zealand), 5(2):31-37, May 1971. 6 refs. (Presented at the Clean Air Society, Victoria Branch, Sept. 1970.)*

At present almost half of Australian primary energy consumption is supplied by petroleum products; typical property ranges for the oil fuels commonly available in Australia are given, including an average sulfur content of two to .25%. Variables affecting smoke and soot emissions from atomizing burners are discussed. Although desulfurization of fuel and/or flue gas may ultimately solve problems of sulfur oxide emissions, present costs remain excessive; the usual alternative for the small consumer at present, if a low-sulfur fuel oil is not economically available, is dispersion from high chimneys. Correct chimney design for height and for high exit gas velocities can enhance the effectiveness of such dispersion. Improved efficiency of many industrial oil-burning plants by installation of an instrument such as a carbon dioxide or excess oxygen recorder would achieve a drop in consumption of 90,000 tons of fuel oil for every one percent overall increase in combustion efficiency, representing reduced sulfur dioxide emissions by about 5000 tons. Costs would compare very favorably with fuel desulfurization costs. Control methods for acid smut formation in high efficiency boilers are discussed, and data are given on various dry absorption processes for SO2 and on system benefits with improved burner design.

15608 APTIC NO. 34025

Barron, A. V., Jr.

PARTICULATE AND SO2 CONTROL TECHNOLOGY FOR THE SMALL AND MEDIUM COAL-FIRED BOILER. *Combustion, 43(4):44-56, Oct. 1971. (Presented at the Industrial Conference, Lafayette, Ind., Oct. 7-8, 1970.)*

In firing one ton of coal with two percent sulfur, some 40 pounds of sulfur is burned and released into the flue gas. This 40 pounds of sulfur combines with oxygen to form 80 pounds of sulfur dioxide. The sulfur oxides react with moisture resulting in sulfuric acid, eventually making some 125 pounds of sulfuric acid. The particulates include fly ash, which is the unburnable inert material in fuels; soot, which is the burnable unburned material left from inefficient combustion; and lead, unburnable additive in gasoline. Electrostatic precipitators, bag or fabric collectors, mechanical dust collectors or multiple cyclones, scrubbers or washers, and thermal or catalytic converters are discussed for use in air pollution control. Design criteria are presented, as well as advantages and disadvantages. An SO2 scrubbing system project built to operate as a mobile pilot plant, unique in the Zurn designed particulate-SO2 removal system for the City is discussed. The scrubbing slurry will be a combination of sea water and pulverized native coral marl.

15609 APTIC NO. 34272

Barthel, Yves, Yaouda Bistri, Andre Deschamps, Phillippe Renault, Jean-Claude Simandoux, and Robert Dutriau

THE IFP PROCESS FOR REDUCING TOTAL SULFUR IN CLAUS UNIT TAIL GAS. *Proc. Am. Petrol. Inst., Div. Refining, vol. 51:57-71, 1971. (Presented at the American Petroleum Institute, Division of Refining, Midyear Meeting, 37th, San Francisco, Calif., May 12-14, 1971.)*

The Institut Francais du Petrole (IFP) process for treating Claus unit tail gas yields sulfur dioxide effluent in the range of 1500-2500 ppm after incineration. The basic reaction of the IFP process is the same as that in the Claus unit. The reaction is carried out in a solvent which dissolves the hydrogen sulfide, sulfur dioxide, and a catalyst. Solubility of sulfur in the solvent is low, and product sulfur is continuously separated from the reaction mixture. Lower temperatures also favor sulfur production, but they must not be low enough to permit condensation of water, or plugging due to solidification of the sulfur. Temperatures in the range 230-320 F seem to be optimum. The solvent/catalyst system developed by IFP combines the following characteristics: high catalyst activity; good thermal and chemical stability of both catalyst and solvent; low solvent vapor pressure to minimize volatilization losses; good physical properties of solvent to maximize gas/liquid contact with no foam formation; low solubility of sulfur in solvent, and wide difference in specific gravity, to enhance ease of separation; low solubility of solvent in sulfur for maximum product purity; ready commercial applicability of both solvent and catalyst at low cost. Process variables are cited. Almost four years operation of a pilot plant at Solaize, France, shows the process to be reliable and easy to run.

15610 APTIC NO. 34037

Beaumont, Max

MODERN CHIMNEY DESIGN. *Clean Air, 1(1):10-14, Spring 1971.*

Operational design of modern stacks is examined. Factors for consideration include efficiency, economy, height of chimney, velocity and temperature of flue gases, insulation, and loading capacity. Various chimneys are described, including Multiflue chimneys and steel chimneys. The construction and operational characteristics of each are discussed.

15611 APTIC NO. 34143

Beavon, David K. and Frank W. King

PREVENTION OF AIR POLLUTION BY SULFUR PLANTS. *Preprint, Canadian Natural Gas Processing Assoc., 11p., 1970. 2 refs. (Presented at the Canadian Natural Gas Processing Association, Sept. 18, 1970.)*

In 1970, an estimated 30 million long tons of elemental sulfur will be produced; of this amount, about 9 million will be produced by the Frasch Process, 8 million from pyrites and native sulfur mining operations, 8 million recovered from sour petroleum products, and 5 million recovered from smelter and other industrial gases. When large reserves of sour crude oil and sour natural gas were discovered in several parts of the world during the mid-fifties, the importance of sulfur recovery became clear. Hydrodesulfurization processes replaced less efficient chemical treatment processes for sour crude, and natural gas treating processes became a common requirement for natural gas processors. In both cases, the modified Claus process was generally employed to recover elemental sulfur from the hydrogen sulfide removed or generated from the sour petroleum products. By adding conversion stages and by refinements in design, recovery in some sulfur plants has risen from 92 or 93% to about 97%; i.e., losses to the atmosphere have been cut in half. Hydrogenation with a cobalt molybdate catalyst is very effective for converting sulfur to hydrogen sulfide. Other sulfur removal processes are cited.

15612 APTIC NO. 34062

Bell, Morton A.

A GUIDE TO THE SELECTION OF PROPER AIR FILTERS. *Heating, Piping, Air Conditioning, 42(9):82-86, Sept. 1970.*

Guidelines to the proper selection of air filters should include efficiency requirements, initial and operating costs factors, maintenance characteristics, effect on system of air friction loss, and equipment space requirements. The desired level of cleanliness should be considered, as well as the dirt content of the air entering the filter and the protection of heat transfer and air distribution components of the system.

15613 APTIC NO. 33754

Benner, Don W.

REMOVING AEROSOLS. *Textile Ind. (Atlanta), 135(10):61-64, Oct. 1961. 1 ref.*

The main method of removing oil and water contaminants from compressed gases is coalescence. Maximum coalescing is obtained in a cylindrical device in which a cloth-like layer of silicon-treated borosilicate densely packed with layers of borosilicate glass microfibers. The cloth-like layer removes very small solid particulates, while the microfibers effectively coalesce liquid droplets from five to 0.01 micron. As long as air is flowing, this design results in an almost continuous film of liquid on the borosilicate barrier. An outer cover of porous foam traps the coalesced film of liquid, which migrates within the foam cover to a sump and out of the gas system.

15614 APTIC NO. 33824

Benner, Don W.

REMOVAL OF OIL AEROSOLS FROM COMPRESSED AIR AND OTHER GASES. *Water Sewage Works, 118(9):276-277, Sept. 1971. 1 ref.*

Years of experience have proven that liquid particulates are best coalesced from compressed air by controlling air flow and velocity as it passes through a minutely stranded, electrostatically charged, fibrous bed of predetermined porosity. A filter that consists of laminations of materials to prefilter the air, a layer of borosilicate or a comparable inert media, and an afterfilter layer fine enough to prevent migration of the media achieve maximum coalescing for aerosols. The removal of oil aerosols by borosilicate glass is discussed.

15615 APTIC NO. 34007

Bennett, R. R.

AIR QUALITY, SOUND CONTROL, AND ESTHETICS III. *Combustion, 43(4):12-14, Oct. 1971.*

The constituents of fossil plant stack gases, which are receiving primary attention from legislative bodies, include particulate matter, sulfur oxides, and nitrogen oxides. Particulate matter may be removed from flue gases by a mechanical collector, an electrostatic precipitator, or a wet scrubber. Ash from a low-sulfur coal is difficult to collect in a precipitator, due to its resistivity at the temperature normally obtained at the outlet from the air heater. The systems proposed to date for the removal of sulfur oxides may be divided into two broad categories: chemical scrubbing systems which saturate the flue gas, and dry systems which do not add moisture to the flue gas. The furnace injection system introduces pulverized limestone through nozzles located above the burners, or premixed with coal prior to pulverization, and introduced through the burners. A large furnace, particularly in the burner zone, is an effective but costly way of controlling oxides of nitrogen. The most effective control means developed to date appears to be the use of a gas recirculation fan to either introduce gas to the windbox prior to entering the burner or to deliver gas to openings adjacent to the burners. Investment factors and energy costs are considered.

15616 APTIC NO. 33507

Berger, Heinz

A PROCESS FOR THE PREPARATION OF A CATALYST. *(Procede de preparation de catalyseur). Text in French. (Assignee not given.) French Pat. 1,515,978. 5p., Jan. 29, 1968. (Appl. Oct. 28, 1966, 4 claims).*

The patent describes a process for the preparation of a catalyst for afterburners designed to oxidize exhaust gases from internal combustion engines. The catalyst consists of a catalytic substance like metal salts or oxides mixed with a refractory material like kaolin or clay, pulverized in a ball mill at 80-100 C, and converted by the addition of water to a moist plastic mass. This mass is pressed into a fabric of a two mm mesh and one mm fiber thickness; the fabric is then shaped into a desirable form and calcined at 500-1000 C. The fabric disappears and a discontinuous structure permeated by countless capillary channels results. An alternative procedure impregnates a fabric with a catalytic substance, with the twisted fibers of the fabric crossing each other at right angles or obliquely. By choice of the appropriate fiber thickness, weave, and coating, a shaped catalyst is obtained which is eminently suited to the combustion dynamics of the gas to be oxidized. A suitable catalyst for the oxidation of exhaust gases without flame consists of 8-20% cobalt, 6-20% manganese, 1-10% copper, 0.005-5% platinum and magnesium and/or aluminum silicate as carrier processed as above. This catalyst is heated by a wire encased in a quartz tube, part of which is exposed to hot gases.

15617 APTIC NO. 33905

Bettelheim, Jan, Frantisek Frantisak, Jaroslav Derka, and Rostislav Klimecek

A METHOD OF PRODUCING CONCENTRATED SULFUR DIOXIDE FROM INDUSTRIAL WASTE GASES BY THE CYCLICAL AMMONIA METHOD. *(Zpusob vyroby koncentrovaneho kysliciku siriciteho z prumyslovych odpadnich plynu cpavkovou cyklickou metodou). Text in Czech. (Czechoslovak Government) Czech. Pat. 114,564. 3p., May 15, 1965. (Appl. Nov. 15, 1964, 4 claims).*

The method described concentrates SO2 from highly dilute waste gases to practically 100% SO2 by a reaction in an absorber between SO2 and (NH4)2SO3 yielding (NH4)HS03. By heating with steam in a regenerator, this is converted back to ammonium sulfite and practically 100% gaseous SO2. The indispensable temperature difference between absorption and regeneration governs the economics of the process. The temperature difference occurs before the absorption of SO2 by a solution of a mixture of ammonium bisulfite, sulfite, and sulfate achieved by cooling the waste gas down to less than 45 C in an indirect heat exhchanger. A small amount of SO2 remains in the cooler condensate, which also retains the dust contained in the gas. Ammonium sulfate which forms by side reactions is removed from the regenerated solution by crystallization through cooling.

15618 APTIC NO. 34224

Bice, G. W. and A. F. Aschoff

STATUS OF SO2 REMOVAL SYSTEMS. *Preprint, Illinois Inst. of Tech. Chicago, Ill., Technical Center, 31p., 1969. 17 refs. (Presented at the American Power Conference, Annual Meeting, 31st, Chicago, Ill., April 22-24, 1969.)*

Some of the pertinent aspects of the Air Quality Criteria for Sulfur Oxides are reviewed, followed by a description and discussion of several of the sulfur dioxide removal systems in current use or development. Information is given regarding the present sulfur market, and a comparison is made of three processes which have progressed to the installation or large pilot plant stage. Health, visibility, corrosion, and vegetation are mentioned with regard to the criteria for sulfur dioxide emissions. The Combustion Engineering sulfur removal process recovers no by-product. It essentially consists of feeding limestone or dolomitic limestone through a conventional coal pulverizer into the boiler followed by wet scrubbing of the effluent gases. The Wellman-Lord process recovers sulfur from the flue gas, in the form of anhydrous, liquefied sulfur dioxide. Developed by the Monsanto Company, the Cat-Ox process uses a catalyst to convert sulfur dioxide to sulfur trioxide, which is then condensed in a gas stream. Another process utilizes alkalized-alumina as an absorbent and consists of four distinct steps. Atomics International has developed a system that utilizes an absorber, which contacts the flue gas with a molten mixture (lithium, sodium, and potassium carbonates) which melts at about 750 F. Costs are indicated.

15619 APTIC NO. 33895

Bitetto, Valerio, Alberto Scaramelli, Giorgio Sotgia, and Carlo Felice Vivani

THE HYDRODYNAMIC BEHAVIOR OF THE FLOW OF FUMES IN A THERMOELECTRIC CENTER. INVESTIGATION OF THE MODEL AND COMPARATIVE MEASUREMENTS IN THE PLANT. *(Sul comportamento fluidodinamico del circuito dei fumi di un gruppo termoelecttrico. Indagine sul modello e misure di paragone sull impianto). Text in Italian. Termotecnica (Milan), 21(12):672-677, Dec. 1967. (Presented at the Congresso Nazionale ATI, 21st, Padova, Italy, 1967.)*

In order to obtain a uniform distribution of the flow of fumes at the intake into the precipitator, the behavior of the flow of fumes in a model circuit was compared to the practical functioning of such a circuit in a thermoelectric plant. Measurements regarding the distribution of the flow of fumes in the precipitator (actually, upstream of the perforated plate placed in front of the precipitator) revealed that the maximum deviation between the value obtained in the model and the practical values was only 2.75%. The distribution of plant installation (19%), taking into consideration the regulating action of the perforated plate, was very much similar to that measured in the model. In the reproduction of the plant conditions (in the model), simplifications were made with regard to preheaters, precipitator, and rigidity truss; further, Reynold s number in the model was 22 times lower than in actual practice.

15620 APTIC NO. 33897

Braginets, N. G.

REDUCTION OF ATMOSPHERIC DUSTINESS. *(Snizheniye zapylennosti vozdushnogo basseyna). Text in Russian. Metallurg, no. 11-12:40-41, 1969.*

Some improvements in the purification of flue gases in converter production of steel are discussed. The gas purifier TTsP was provided with 18 venturi pipes which were wetted by jets. Two blade separators followed the pipes. Using venturi pipes of a larger diameter than 221 mm stabilized the process of gas purification during the converter operation. Flue gases from open hearth furnaces (remaining dustiness was 100-150 mg/cu m) was achieved by combination of wet gas purifiers, a small number of venturi pipes with cyclones, and scrubbers with a 4400 mm diameter. The addition of 40% lime and fluorite to the cast iron scrap decreased the amount of dust carried away by convection.

15621 APTIC NO. 33451

Briggs, Warren S., William A. Stover, and John L. Warthen

METHOD OF TREATING EXHAUST GAS. *(Grace (W. R.) and Co., Clarksville, Md.) U. S. Pat. 3,295,918. 4p., Jan. 3, 1967. 5 refs. (Appl. Sept 6, 1962, 3 claims).*

An automobile exhaust catalyst with excellent hydrocarbon and carbon monoxide conversion activity, as well as good resistance to the lead in the exhaust, can be prepared to contain 2-12% copper oxide, 0.0025 to 0.4% palladium, 2 to 18% manganese dioxide, and 1 to 20% chromia. Palladium improves the cold-start activity of these catalysts. The process of preparing the catalyst consists of selecting a suitable base and impregnating it with a solution prepared by mixing a soluble chromia compound with water and mixing this solution with a manganese compound. This solution is mixed with a copper salt-palladium salt solution. After the impregnation, the catalyst is dried for a short period of time at about 120-260 F. Reimpregnation may be required to give the desired metal level and if necessary, the catalyst is redried at a temperature of 120-260 F for 4 to 48 hours. The final step of catalyst preparation is calcination for 1 to 3 hours at 1400 F.

15622 APTIC NO. 33890

Brodskiy, Yu. N., V. I. Lazarev, and V. A. Pinayev

DESULFURIZATION OF SMOKE GASES. *(Obesserivaniye dymovikh gasov). Preprint, EEC Work Group on Air Pollution Problems (USSR), 1970. 17 refs. (Presented at the Seminar on Desulfurization of Fuel and Flue Gas.) Translated from Russian. Leo Kanner Assoc., Redwood City, Calif., 25p., March 1971.*

When heat and electric power stations, designed to burn coal containing about 2.5% combustible sulfur, began to be constructed in Moscow and other industrial centers in the 1930s, research work was started on a broad scale toward the control of sulfur dioxide emissions. Methods were tested in large experimental and industrial installations. Catalytic oxidation of sulfur dioxide produces sulfur trioxide in an aqueous medium in the presence of a manganese ore. An ammonia-autoclave method is used to absorb SO2 by an aqueous solution of ammonium sulfite-bisulfite with the subsequent decomposition of spent solutions in an autoclave to ammonium sulfate and elementary sulfur. The limestone method is based on the sorption of SO2 by suspensions of lime or active limestone, producing a mixture of crystals of calcium sulfite and sulfate. The magnesite method uses the absorption of SO2 by suspensions of magnesium oxide, producing crystals of magnesium sulfite Mg-SO3.6H20, which are roasted by the hot smoke gases at 800-900 C. Modifications of these methods were also tested, and additional procedures and costs are indicated.

15623 APTIC NO. 34079

Brooks, S. H. and W. J. Calvert

EXTERNAL POLLUTION FROM AN IRON AND STEELWORKS AND MEASURES TOWARDS ITS REDUCTION. *Iron Steel Inst., London, Spec. Rept., no. 61:5-15, 1958. 17 refs. (Presented at the Iron and Steel Institute, Air Pollution Meeting, London, England, Sept. 25-26, 1957.)*

Emissions from iron and steelworks are examined with respect to specific sources, control methods, and annual costs. Cokemaking, ore preparation, ironmaking, steelmaking, reheating and heat treatment, boilers, locomotives, and steam cranes, along with their various individual processes, emit smokes, dusts, hydrogen sulfide, sulfur in stack gases, iron oxide fumes, sulfur oxides, and grit. The control measures already in use or proposed for future installation included process and constructional modifications, the dry coke quenching technique, cyclone separators, cooling, drying, secondary cleaners (bag filters and electrostatic precipitators), settling chambers, high stacks, venturi scrubbers, continuous slag-wool filters, fuel desulfurization, and monitoring techniques. Data on emissions correlated to source, amount, control method, annual cost, and efficiency are included.

15624 APTIC NO. 33548

Brough, John R. and William A. Carter

AIR POLLUTION CONTROL OF AN ELECTRIC FURNACE STEELMAKING SHOP. *Preprint, Air Pollution*

Control Assoc., Pittsburgh, Pa., 31p., 1971. 4 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 64th, Atlantic City, N. J., 1971, Paper 71-158.)

The selection of dust collection equipment was explained. General shop production requirements were established at 100 tons of steel/hr. A conventional swing roof furnace design was selected for the pair of furnaces in the shop. The concept of total emissions control was adopted as the goal. Fume collection methods were studied, and a double collection system was chosen. Roof truss hoods were installed to control all general emissions to the shop atmosphere. The hoods are located directly over each furnace, above the service crane travel area. Each hood is partitioned into three sections to permit localized concentration of the draft over a particular fume generating area. The second collecting method is by direct evacuation from the furnace shell through a water-cooled duct system. The hot furnace gas in the ducts is cooled by mixing with ambient shop air. Gases from the hoods and the dust are mixed together and drawn into large induced draft fans. The fans blow the gases into a baghouse where the dust is filtered out, and the cleaned gases escape to the atmosphere. Temperature of the gases entering the baghouse is closely controlled by regulating the amount of ambient air admitted through the roof truss hoods and the air valves along the ducts. An emergency bypass stack protects the baghouse from system control failure. Dust is processed in a rotating drum where it is mixed with just enough water to cause it to agglomerate into pellets. The pellets are used for landfill. The quantity of dust collected averages about 30 lb/ton steel. Emissions from the shop are negligible and the environment within the building is quite good. (Author abstract modified)

15625 APTIC NO. 33609

Burnat, Boguslaw

INFLUENCE OF WATER FOG PULVERIZATION ON THE REDUCTION OF DUST CONCENTRATION IN AIR. *(Wplyw rozplania mgly wodnej na zmniejszenie stezenia pylow w powietrzu). Text in Polish. Przegl. Gorn., 26(4):154-7, 1971. 7 refs.*

On the basis of studies of fibrogenous agressiveness of dust and fractional analysis of dust found in the lungs of miners deceased of anthracosis, the nature of dust harmful to human health was clarified. Only dust granules of small diameter settle in the lungs. Thus, dust with granules of five micrometer diameters and smaller is considered harmful. Analysis of the effect of water droplets on atmospheric pollution by dust shows that effectiveness of their mutual collisions (i.e., coagulation) depends on diameter of dust granules and water droplets, on density of dust, and on relative velocity of dust granules with respect to water droplets in the moment of collision. The possibility of the use of the coagulation effect in reduction of dust concentration in the atmosphere is considered. To a limited extent, coagulation can be increased by decrease of water droplets diameter relative to diameter of dust granules and by directing water pulverizers in a direction opposite to the flow of polluted air. Due to small diameter of the dust most harmful to human health, the method does not appear to be of practical use.

15626 APTIC NO. 33550

Burtner, R. E.

GASOLINE CHARACTERISTICS AND AIR CONSERVATION--A REVIEW OF API ENGINE FUELS STUDIES. *Preprint, American Society for Testing and Materials, Philadelphia, Pa., 26p., 1970. 16 refs. (Presented at the American Society for Testing and Materials, Workshop on Effect of Automotive Emission Requirements on Gasoline Characteristics, Toronto, Ontario, June 24, 1970.)*

Some suggested remedies for pollution of the air by automotive emissions have been changes in volatility and composition of the gasoline and the removal of lead antiknock agents. Several programs have been run under the sponsorship of the American Petroleum Institute to investigate not only whether these changes would clean air through lower emissions, but also the effect on car performance. Elimination of evaporation losses by evaporation loss control hardware is much more effective than any reasonable reduction in volatility, even as low as five pounds RVP, and more effective than removal of all olefins boiling below 220 F from gasoline. Reduction of fuel volatility to the five pound RVP level would be expected to result in degraded warming-up performance in a substantial percentage of new cars in the hands of the customer if the prevailing ambient temperature is 50 F or lower. For cars in poorer condition (or the more average car) degraded performance might be expected at prevailing ambient temperatures at least 10 F above this. A small adverse effect on the amount of exhaust hydrocarbon emissions accompanies a volatility reduction. Mass evaporative losses are unaffected by the presence or absence of lead if volatility is not changed. No important differences could be found in the mass exhaust gas hydrocarbons due to the absence of lead from the tested fuels in cars with typical deposits from commercial gasoline. The pollution effect of unleaded gasolines may be greater than leaded gasolines because of fuel compositional changes required to maintain octane quality, although some reactivity scales show no appreciable increase in the smog potential due to these changes. (Author conclusions modified)

15627 APTIC NO. 34289

Callen, B. A.

DEVELOPMENT OF A HIGH ENERGY SCRUBBER SYSTEM FOR HOT BLAST CUPOLAS. *Clean Air (J. Clean Air Soc. Australia New Zealand), 5(3):43-48, Aug. 1971. (Presented at the Society of Mechanical Engineers of Australasia, Sydney, Australia, March 1971.)*

A flooded disc high energy scrubbing system was developed that is effective for cleaning hot blast cupola waste gases. After combustion the gases are pre-cooled in a heat exchanger with air before scrubbing, thus reducing water consumption, and the heated air is subsequently used to restore buoyancy and disperse the residual steam plume. Variable speed motors reduce power consumption. Important design considerations were efficiency, to meet regulations that the particulate conten of effluent gases not exceed 0.1 grains/n ft; disposal of the waste gases, which have a high carbon monoxide content; cupola gas takeoff; and combustion chamber requirements. Details are given of equipment selection, flow volume control, flue gas cooling, exhaust fan capacity, the mixing stack, and lime dosing and sludge handling. The capital cost of the system for handling 40,000 cu ft/min of dry gas was just under $400,000, or $10/(cu ft)/min gas.

15628 APTIC NO. 33867

Calvert, Seymour and L. Karl Legatski

A COMPREHENSIVE STATE-OF-THE-ART EVALUATION FOR ALL TYPES OF DUST COLLECTION EQUIPMENT THAT MAY BE APPLICABLE IN UNDERGROUND COAL MINES. *Garrett Research and Development Co., Inc., La Verne, Calif., Bureau of Mines Contract S0100231, GRD Rept. 70-105, Bureau of Mines OFR-4-71, Dec. 1, 1970, 44p. 14 refs.*

NTIS: PB 197739

Basic dust collection mechanisms were analyzed, and pilot plant studies were conducted to determine what types of collection equipment, based on inertial mechanisms, might be applicable to respirable coal mine dust. A given collector should reduce dust with a mean diameter of 2.55 micron to below the prescribed maximum concentration of two milligrams/cu m. Based on experimental results, co-current atomization, or venturi scrubbers can achieve the desired performance. However, several design considerations make it more difficult to adopt the venturi scrubber to the mine environment than a lower energy scrubber. The higher pressure drop of the venturi requires an additional energy output, and the higher water rate creates an additional disposal or recirculation problem. Moreover, venturi scrubbers are typically 15 to 20 feet tall, and redesigning for a four foot vertical space will be a major task. No commercially available venturi is readily adaptable to the mine environment. Cyclones, impingers, filters, packed scrubbers, sprays, and impactors are also mentioned.

15629 APTIC NO. 33994

Charlson, R. J. and J. M. Pierrard

VISIBILITY AND LEAD. *Atmos Environ., vol. 3:479-480, 1969. 8 refs.*

An estimate is made of how much of an improvement in visibility could result from the control of automotive lead emissions. One approach is to use the recently published linear relationship between aerosol mass concentration and visual range and published values for the fraction of lead in the atmospheric aerosol. Another approach to estimating the fraction of the total mass concentration (and therefore of the visibility degradation) in situations which are dominated by the automotive source is to utilize known relationships between the various pollutants. Both methods are considered, and it is interesting to note the the approximate agreement of the two approaches to the estimation of the percentage of extinction coefficient atributable to lead compounds.

15630 APTIC NO. 33852

Cornelius, Walter and Wallace R. Wade

THE FORMATION AND CONTROL OF NITRIC OXIDE IN A REGENERATIVE GAS TURBINE BURNER. *Preprint, Society of Automotive Engineers, Inc., New York, 21p., 1970. 16 refs. (Presented at the Combined National Farm, Construction and Industrial Machinery and Powerplant Meetings, Milwaukee, Wis., Sept. 14-17, 1970, Paper 700708.)*

Two techniques were investigated to reduce the emissions of oxides of nitrogen from a conventional regenerative gas turbine burner that involved only minor changes to the burner configuration and did not impair overall burner and engine performances. These methods were to vary the primary zone equivalence ratio and to shorten the residence time of the gas in the primary zone. Significant reductions in nitric oxide emissions were obtained by applying both methods, singly and in various combinations with one another, to the burner of the General Motors GT-309 vehicular regenerative gas turbine. Reductions in emissions that were measured on a single burner test facility at simulated engine steady-state conditions were confirmed when operating a GT-309 gas turbine powered vehicle over the HEW passenger car emission test cycle. From these evaulations, a computer simulation program was developed to determine closed cycle true mass HEW emission values for typical gas turbine powered passenger cars. Computed results indicate that further changes in current burner design and operating practices will be needed to meet the Federal 1980 target for nitrogen oxides without sacrificing engine performance and economy. In contrast, burner exhaust emissions of hydrocarbon and carbon monoxide should be of less concern. (Author abstract modified)

15631 APTIC NO. 33619

Cser, Gyula

A NEW METHOD FOR THE IMPROVEMENT OF EXHAUST GAS TURBO CHARGING. *(Ein neuartiges Verfahren zur Verbesserung der Abgasturboaufladung). Text in German. Motortech. Z. (Stuttgart), 32(10):368-373, Oct. 1971. 7 refs. (Presented at the Fisitakongress, Brussels, Belgium, 1970.)*

A new method is described for exhaust gas turbocharging, which avoids an unnecessarily high surplus of air and the excessive increase of cylinder pressure. The turbocharger supplies air through a connection pipe into an expansion chamber, where the air is passed through a resonance tube into two resonance containers, and then through the intake pipe into the cylinder. This new combined charging process greatly reduces the development of smoke. No special auxiliary equipment is required.

15632 APTIC NO. 33367

Dikun, P. P., N. D. Krasnitskaya, G. P. Komina, E. G. Levitina, L. S. Sarochinskaya, G. N. Severinets, and N. L. Staskevich

THE STUDY OF FORMATION OF CARCINOGENIC HYDROCARBONS IN NATURAL GAS COMBUSTION. *(Izucheniye vozmozhnosti obrazovaniya kantserogennykh uglevodorodov pri sgoranii prironogo gaza). Text in Russian. Vopr. Onkol., 17(6):77-83, 1971. 9 refs.*

The products of natural gas combustion in burners were analyzed for determination of the concentrations of benzo(3-4)pyrene, pyrene, carbon monoxide, nitrogen oxides, and solid particles. The combustion gases from an infra-red burner contained no benzo(3-4)pyrene and only small amounts of CO and NOx. The amount of primary air, degree of homogeneity of the gas-air mixture, and the secondary air supply influenced the formation of polycyclic hydrocarbons in the combustion gases of inspirator and forced air supply burners.

15633 APTIC NO. 33603

Dittrich, A.

ATMOSPHERIC GAS BURNERS AND HEATING BOILERS. *(Atmosphaerische Gasbrenner und Heizungskessel). Text in German. Oel Gasfeuerung, 16(10):971-976, Oct. 1971.*

In countries with large natural gas supplies, boilers with atmospheric burners for heat production are preferred. For carbon monoxide-free combustion, the exit speed of the fuel gas from the injection nozzle must be between 0.3 to 0.6 m/sec corresponding to the maximum pressures of 80 mm at city gas and 180 mm at natural gas. About 40 to 48% of the total primary air for combustion must be drawn along with the fuel. An insufficient secondary air supply leads to CO formation which is optically recognizable by the yellow flame.

15634 APTIC NO. 33542

Doelling, R. P., A. F. Gerber, and M. P. Walsh

THE EFFECT OF GASOLINE CHARACTERISTICS ON AUTOMOTIVE EXHAUST EMISSIONS. *Preprint, American Society for Testing and Materials, Philadelphia, Pa., 22p., 1970. 17 refs. (Presented at the American Society for Testing and Materials, Workshop on Effect of Automotive Emission Requirements on Gasoline Characteristics, Toronto, Ontario, June 24, 1970.)*

Fuel modifications encompassing composition, volatility, and lead content were investigated as a means of reducing automotive exhaust emissions. Several test programs are summarized. Certain hydrocarbons exhausted by automobiles are known to be more reactive than others in the formation of Los Angeles or photochemical type smog. These more reactive hydrocarbons, notably olefins, are assigned higher weighting values when total engine exhaust hydrocarbon levels are evaluated for their contribution to photochemical air pollution. However, experiments indicated fuel composition to have no significant effect on exhaust hydrocarbon reactivity. Higher boiling components of gasoline also did not have a significant effect on exhaust hydrocarbon or carbon monoxide emission levels. Exhaust hydrocarbon levels of vehicles operated on fuel leaded to 3.13 grams per gallon were significantly greater than the exhaust hydrocarbon levels of vehicles operated on unleaded fuel. Engine operation on leaded fuel (only one-fourth gram of lead per gallon) also increased exhaust hydrocarbon emissions. (Author abstract modified)

15635 APTIC NO. 34298

Doke, Haunori

SONIC DUST COLLECTOR MAKING USE OF NOISE OF A CRUSHER. *(Funsaiki soon o riyo shite onpa shujin o okonau sochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 46-15396. 3p., April 24, 1971. (Appl. Oct. 2, 1968, 1 claim).*

A method is described for using the ultrasonic sound waves of 150 dB or higher generated in crushing chambers for sonic dust collection. The sound waves are taken through an appropriate duct and led into a dust collection section which consists of resonance pipes, an acoustic chamber, and a resonance tube with a sonic reflector plate. The dust generated in the crusher is transported with air into the collection system, wherein the fine particles are flocculated into larger clusters by the effect of the sound waves. Then the particles are carried through a duct into another cyclone where, now larger in size, they are easily separated from the air stream.

15636 APTIC NO. 33801

Drahorad, Josef, Jaroslav Novotny, and Karel Cerny

PURIFICATION OF GENERATOR GAS AND SEPARATION OF TARS AND PHENOLIC EFFLUENTS. *(Predcistovani tlakoveho generatoroveho plynu a deleni dehtu od fenolovych vod). Text in Czech. Plyn (Prague), 51(9):266-272, 1971. 11 refs.*

Generator gas produced from coal is prepurified to remove heavy tars and coal dust. This prepurification is effected by directing water sprays into the precoolers to wash out the impurities of the gas. At the prevailing temperatures, phenols, fatty acids, and other substances are extracted from the tars and pass into the water which turns into strongly emulsified tars. Method of separate condensation of tars and phenolic from crude pressure gas is described to remove heavy tars and coal dust at temperatures slightly above the dew point. The equipment used in a pilot plant consisted of a generator from which the crude gas emerged and a vessel where its temperature was reduced to about 200 degree C with sprays. The gas was then forced through a venturi nozzle into a cyclone for removal of the heavy tar. Phenolic water was also separated and collected at the bottom, while the gas was piped via a drip collector to either a condenser or a waste heat boiler. Thus, a better heat transfer was obtained in the condenser or waste heat boiler. The phenolic effluents were free from tar emulsions, and the prepurified gas, still hot, could be subjected both to detoxication and scrubbing with caustic solutions.

15637 APTIC NO. 33346

Drehmel, D. C.

TEST TO EVALUATE REACTIVITY OF BOILER-CALCINED LIMESTONE USED IN AIR POLLUTION CONTROL. *Ceram. Bull., 50(8):666-668, 1971.*

If injected limestone calcines at very high temperatures, a less reactive lime results and sulfur dioxide removal efficiency declines. This loss of reactivity, known as deadburning, may be measured by several standard techniques if the test sample is strictly lime. However, evaluation of the dry limestone injection process requires measurements of deadburning on partially sulfated test samples of limited size diluted with fly ash. The results are reported of chemical and physical property tests of three series of calcined carbonate rocks. Several tests were then selected for a study of the effects of test parameters, partial sulfation, and dilution with fly ash. Three reactivity tests were suitable as field tests for deadburning on samples of limited size diluted with fly ash. One of these, the hydration weight gain test, is recommended because it is independent of the degree of sulfation. (Author abstract modified)

i5638 APTIC NO. 33623

Eick, H.

SERVICE FOR HEATING SYSTEMS. *(Service fuer Heizungsanlagen). Text in German. Oel Gasfeuerung, 16(10):958-964, Oct. 1971.*

For proper functioning of oil heaters it is always important to adjust the burners properly. The combustion efficiency or the waste gas loss depends on the carbon dioxide content and on the waste gas temperature. Measures which reduce the waste gas temperature at high CO2 values improve the efficiency more than efforts aiming at a more complete combustion. The waste gas losses depend on the waste gas quantity and the temperature. It is desirable to operate with a minimum of excess air. The combustion process can be termed efficient when a synthesis between highest achievable CO2 content and lowest permissible soot number is accomplished. The pressure atomizers which are usually used for oil-fired boilers have a narrow range in which a relative high CO2 content and a soot number below two (according to DIN standard 4787) can be maintained. At lower air surplus or higher CO2 content, the soot number increases in similar manner as at higher air surplus and low CO2. The soot number and the quantity of carbon particles in the waste gas should be periodically monitored.

15639 APTIC NO. 33749

Elenkov D., A Assenov, and G. Grozev

SULFUR DIOXIDE SORPTION ON AN ADSORBENT MADE OF THE XYLITE FRACTION OF LIGNITE COAL. *(Schwefeldioxid-Sorption an ein Adsorbens aus dem Xylitanteil der Lignitkohle). Text in German. Wasser Luft Betrieb, 15(10):363-366, Oct. 1971. 11 refs.*

The adsorption and desorption properties of low-temperature coke made from the xylite fraction of lignite coal were studied for its possible use as adsorbent for waste gas desulfurization. The experiments were conducted with a gas mixture consisting of 0.4 to 0.6% by volume of SO2, 8% by volume of 02, and the remainder of N2. The adsorption was carried out in a glass column of 14 mm diameter and 350 mm height. The column was filled with 50 ccm of coke. The influence of temperature, humidity, and of particle size of the adsorbent was studied. With increasing temperature, the quantity of the adsorbed sulfur dioxide decreased rapidly to a temperature of 50 C. Above 50 C, the quantity hardly changed. The adsorption capacity of xylite low-temperature coke increased with increasing moisture of the gas at temperatures up to 100 C. Coke with particle sizes of 3 to 4 mm and with 4 to 6 mm was used at adsorption temperatures of 25 and 50 C. With decreasing particle size of the coke, the adsorption capacity increased. The coke was regenerated by programmed thermal treatment at temperatures up to 450 C. The desorption process was largely dependent on the temperature of the adsorption; adsorption carried out at 20 C yielded an SO2 desorption rate of 45% at temperatures up to 95 C. Above this temperature, the desorption speed dropped.

15640 APTIC NO. 33567

Ellison, Alfred

GASOLINE COMPOSITION RESTRICTIONS AS A MEANS OF AUTOMOTIVE EMISSIONS CONTROL. *Preprint, Natural Gas Processors Assoc., Tulsa, Okla., 11p., 1971. (Presented at the Natural Gas Processors Association, Annual Convention, 50th, Houston, Tex., March 17, 1971.)*

Current and prospective Federal emission standards for gasoline engine exhausts, with fuel composition features related to emissions, and research being done in the Air Pollution Control Office to provide additional information on emission problems are reviewed. Existing exhaust emission standards for hydrocarbons and carbon monoxide will be tightened to obtain a 90% reduction in emissions from 1975 models over those from 1970 models. A nitrogen standard to be applicable to 1973 models will require a 90% reduction in emissions from 1976 models compared with those emitted from 1971 models. A standard requiring complete control of crankcase hydrocarbon emissions was applicable to 1968 model vehicles. The 1971 models are subject to a standard for evaporative losses; this standard will be tightened for 1972 models. Emission standards for particulates and reactive hydrocarbons are under consideration. A standard for particulates would contribute to control of polynuclear aromatic emissions, but restrictions on the polynuclear content of gasolines may be necessary. Current APCO research and development projects include work on a standardized sampling and measurement procedure for particles in auto exhaust, a study of the photochemical reactivity of mixtures of evaporative and exhaust emissions from representative vehicles and gasolines, and investigation of the interrelationship between fuel characteristics and composition and engine factors.

15641 APTIC NO. 33654

Emi, Jun, Kiyoshi Nakata, and Kikuo Okuyama

FILTRATION OF AEROSOL BY MICROSCREEN. *(Maikuro sukurin ni yoru earozoru no roka). Text in Japanese. Japan Society of Chemical Engineering, Western Branch, Proc. Chem. Eng. Conf. North Central Japan, 1971, p. 7-9, 3 refs. (Oct.)*

The efficiency of microscreens as aerosol filters was determined by calculations and experiments. The dust collection rate was first calculated on a formula of viscous flow velocity around a ribbon, and this was adjusted with respect to the interference rate of woven ribbons. In order to capture aerosols of approximately one micron diameter, ribbons with larger than 10 micron widths must be used. The single ribbon collection efficiency was obtained by computer calculation according to the distribution formula of a perpendicular flat panel viscous flow. Stearic acid particles were diluted by clean air and passed through a microscreen of an extremely thin nickel sheet with right square perforations. Air samplings were captured by tubes in front and behind the screen and were measured by a scattered light concentration meter. The diameters of particles collected on the impactor were measured by a photomicroscope. The results from the experiment were considerably different from the calculated figures. It was concluded that the mechanism of microscreen filtration was influenced by the individual single ribbon collection rate, mutual interference of ribbons, and the air turbulence near orifices. Microscopic photographs revealed that the stearic particulates were not captured in corners of the screen; most particulates were collected by middle portions of the ribbons.

15642 APTIC NO. 34205

Faux, F. and A. J. Clarke

GENERAL ASPECTS OF AIR POLLUTION. *Preprint, International Union of Producers and Distributors of Electrical Energy (UNIPEDE), Paris (France), Thermal Generation Study Committee, 25p., 1969. 32 refs. (Presented at the International Union of Producers and Distributors of Electrical Energy, Thermal Generation Specialists Meeting, 4th, Lisbon, Portugal, Oct. 8-9, 1969.)*

The control of emissions from large central power stations buring coal or oil, with particular reference to practices in Great Britain, is reviewed. The purpose of maintaining close control of combustion conditions is to avoid waste of fuel, corrosion problems with high sulfur fuels, and the emission of smoke and acid soot problems. The main development in recent years has been the reduction in the percentage of excess air so as to approach stoichiometric combustion conditions in the boiler furnace. Electrostatic precipitators are used for dust control. Dust arrestor design and operation and flue dust monitors are discussed. Adequate rapping of the precipitator electrodes is necessary to maintain consistent performance. Dust measurement in the field is also required. Methods of controlling gaseous emissions are considered. Tall chimney stacks are indicated, as well as research on plume rise and dispersion.

15643 APTIC NO. 33857

Fes kov, M. I.

AERODYNAMIC STUDY OF DEDUSTING OF GASES IN AN APPARATUS CONSISTING OF EJECTOR AND CYCLONE. *(Aerodinamicheskoye issledovaniye obespylivaniya gazov v apparate, sostoyashchem iz ezhektora i tsiklona). Text in Russian. Khim. Prom. (Moscow), no. 1:58-9, 1970. 2 refs.*

An air dedusting apparatus is described consisting of an ejector and a cyclone and working with the recirculation of air. The efficiency of an apparatus was studied on air sample containing 500-2000 mg/cu m of coal dust. The air purified with and without air recirculation contained three to six and seven to 13 mg/cu m of coal dust, respectively. The process was analyzed with the aid of the Bernoulli equation. An expression of ejection coefficient was derived. The ejection coefficient values calculated from the formula agreed well with experimental data. Value of ejection coefficient was determined at various nozzle diameters. In the case of air circulation and at the total resistance of the apparatus equal to 240-250 mm water, aerodynamic resistance of the dedusting apparatus increased to four to eight mm H20.

15644 APTIC NO. 33462

Fitzgerald, Joseph J. and Charles G. Detwiler

OPTIMUM PARTICLE SIZE FOR PENETRATION THROUGH THE MILLIPORE FILTER. *Arch. Ind. Health, vol. 15:3-8, 1957. 5 refs. (Presented at the Health Physics Society Meeting, Ann Arbor, Mich., June 1956.)*

The efficiency of Millipore filters in collecting particulate material with particle sizes down to 0.005 micron and the possibility of an optimum particle size for total penetration were investigated. The filter efficiency evaluation was accomplished in two stages: for 0.2 to 2.1-micron particles, with the light microscope, and for 0.005 to 1-micron particles, by electron microscopy. The particle collection efficiency of the Millipore filter depends on particle size and varies with face velocity in the face-velocity range of 10-40 cm/sec. A point of maximum total penetration of particulate material through the filter with respect to particle size was observed, but this point does not affect the application of the Millipore filter as the standard filter in efficiency studies if the efficiency is not too low at the point of maximum penetration. The Millipore filter is an excellent medium for particle-size-distribution and filter-efficiency studies because of the shallow surface collection of particulate material, the ease of rendering the medium transparent with immersion oil for light microscopic examination of the collected particulate material, and the applicability of the silica replication technique for subsequent electron microscopic size-count analyses.

15645 APTIC NO. 33463

Fitzgerald, J. J. and C. G. Detwiler

COLLECTION EFFICIENCY OF AIR CLEANING AND AIR SAMPLING FILTER MEDIA. *Am. Ind. Hyg. Assoc. Quart., no. 16:123-130, June 1955. 8 refs. (Presented at the American Industrial Hygiene Association, Annual Meeting, 15th, Chicago, Ill., April 29, 1954.)*

The collection efficiency of several air cleaning and air sampling filter media were studied at face velocities of 0.5 to 250 cm/sec, using Millipore filters to test the filter media. Solid duraluminum particles with a density of 2.7 gm/cu cm provided the test material for efficiency studies in the particle size range 0.18 to 2.1 micron by light microscope analysis; atmospheric dust was the test material for particles from 0.005 to 0.2 micron. A silica replication of Millipore filter medium was made to prepare the test air samples for electron microscopy. This replication method minimizes the opportunity of forming agglomerates during the process of preparing the Millipore filters for an electron microscope analysis. Particle collection efficiency varied with particle size, face velocity, and the filter medium. The Hollingsworth and Vose-70 filter media and the air cleaning media tested were significantly mmore efficient in the collection of submicron particles than the Whatman filter papers. The best operating face velocity for each Whatman paper over the size range of 0.18 to 2.1 micron is given. Minimum collection efficiency occurred with particles about 0.18 micron; the maximum collection, with particles 2.1 micron in diameter. (Author abstract modified)

15646 APTIC NO. 33435

Florentz, Jean Paul and Claude Jean Victor Vidal

METHOD AND EQUIPMENT FOR THE TREATMENT OF EXHAUST GASES OF INTERNAL COMBUSTION ENGINES. *(Procede et appareil pour le traitement des gaz d echappement des moteurs a explosion ou a combustion interne). Text in French. (Assignee not given.) French Pat. 1,524,303. 2p., April 1, 1968. (Appl. March 30, 1967, 4 claims).*

An aerosol of an aqeous solution of a commercial product such as Ceetal, which by catalytic contact converts CO to CO2, SO2 to SO3 and H2SO4, and which affects H2S and fumes, is injected into the exhaust gas stream of an internal combustion engine before dispersal into the atmosphere. The device is based on the venturi effect which induces aspiration and atomization of the catalytic solution injected into a jet by a tangential stream of atmospheric air, which homogenizes the atomized liquid with the exhaust gas before the hot neutralized gaseous effluents are released into the atmosphere. Continuous supply of the atomized liquid is assured by the combined exhaust gas pressure and venturi effect.

15647 APTIC NO. 33487

Ford, H. S., D. F. Merrion, and R. J. Hames

REDUCING HYDROCARBONS AND ODOR IN DIESEL EXHAUST BY FUEL INJECTOR DESIGN. *Preprint, Society of Automotive Engineers, Inc., New York, 7p., 1970. 8 refs. (Presented at the Combined National Farm, Construction and Industrial Machinery and Powerplant Meetings, Milwaukee, Wis., Sept. 14-17, 1970, Paper 700734.)*

Exhaust hydrocarbons and odor were reduced in Detroit Diesel Series 71 engines by revising the fuel injector tip design. Five injector tips were investigated which had different volumes of uncontrolled fuel below the injector valve. Results are presented to show that exhaust hydrocarbons and odor can be substantially reduced by minimizing the uncontrolled volume of fuel in the injector tip. The hydrocarbon emissions are attributed to uncontrolled fuel being pushed from the tip by expansion of the fuel at elevated temperatures. This conclusion is supported by test results with fuels having different 10% distillation temperatures.

15648 APTIC NO. 34299

Freyschuss, Stig

MODERN METHODS FOR THE REDUCTION OF THE WASTES FROM CHEMICAL PULP MILLS IN SWEDEN. *Water Air Ind., Proc. Int. Cong. PRO AQUA, Basel, Switzerland, 1969, p. 128-141.*

Chemical pulp production has increased greatly in Sweden during the last 25 years, which has caused many severe pollution problems in lakes, rivers, and along the coast of the Baltic. During the last 10 years intensive work has been going on to reduce the waste mainly by internal measures in the chemical pulp mills. There has been a reduction of the fresh water consumption for the pulp processes which has made it possible to recover more of the wastes both in the form of dissolved organic material and fibers. Development of the continuous digester for the sulfate process has been of great importance for development of better washing methods, which means less pollution from the black liquor. The steam stripping of the condensates has reduced the loss of orgainc sulfides and methanol to the recipient. By burning the uncondensable gases after stripping, part of the air pollution problem has found a solution. The evaporation and burning of the spent sulfite liquor is the only effective way of solving the pollution problems at Swedish calcium sulfite mills. Development of efficient washing methods has decreased the loss of sulfite liquor to about 15%, and by using soluble bases such as magnesium or sodium the recovery of spent liquor can be increased to at least 95%. Cross-recovery of chemicals is also mentioned. (Author summary modified)

15649 APTIC NO. 33412

Fukayama, Katsu and Nobuaki Ono

ANTI-CHOKING DEVICES FOR MULTI-CYCLONES. *(Maruchi saikuron no heisoku boshi sochi). Text in Japanese. (Ishikawajima Harima Heavy Industries, Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 46-25983. 3p., Sept. 7, 1971. (Appl. Dec. 16, 1968, claims not given).*

When two multicyclones are used in order to collect dusts effectively, the second cyclones are often clogged with minute dust particles that filter through the first multicyclones. This invention consists of a gravity precipitation chamber which captures coarse particulates in front of the first cyclones, a ventilator behind the second cyclones, and a conveyor pipe installed between the precipitation chamber and the entrance of the second cyclone, which will blow in coarse particulates into the second cyclones and will scrape off the clogging material on guiding blades and outer pipe. These coarse particulates are sucked in by the difference in the air pressures.

15650 APTIC NO. 33962

Gagnidze, A. N. and L. A. Drakin

ON THE PRODUCTION OF SMOKELESS FUEL FOR HOUSEHOLD NEEDS. *(K voprosu polucheniya bezdymnogo bytobogo topliva). Text in Russian. Soobshche. Akad. Nauk Gruz. SSR, 63(1):89-91, 1971. 4 refs.*

Experiments on several coal varieties were carried out to obtain smokeless fuel for household needs. Coal was crushed to a three m illimeter size, caked, and the obtained briquets were then autoclaved under the pressure of their own volatile substances. Compacting pressure, gas pressure within the autoclave, the rate of briquet heating, and the final baking temperature were among the investigated parameters. The variation of caking pressure and gas pressure during the caking process did not affect the briquet porosity. The optimal caking temperature producing briquets with a minimum content of volatile substances (nine to 12%) necessary for easy ignition ranged between 550 and 570 C. The yield in volatile substances decreased to three to four percent and the ignition temperature increased from 315 to 340 C when briquet compacting was carried out at final temperatures reaching 700 C. The briquet burning properties were satisfactory for household needs and elicited a heat capacity of 8200 kcal/kg.

15651 APTIC NO. 33932

Gartenmann, E.

THE POSSIBILITIES OF REDUCING THE LEAD CONTENT IN GASOLINES FOR AUTOMOBILES. *(Ueber die Moeglichkeiten der Herabsetzung des Bleigehaltes in den Benzinen fuer motorische Zwecke). Text in German. Bull. Eidenoess. Gesundheitsamtes, Beilage B, no. 3: 105-144, March 1971.*

It is technically possible to produce lead-free high octane gasoline by catalytic reforming of certain petroleum fractions or by isomerization of light gasoline (Europe) and by catalytic cracking of heavy oil and alkylation of olefins (U.S.A.), but while these processes have been operative in the production of special gasolines and for petrochemical purposes for a long time, the equipment is old and the capacity is inadequate should the addition of lead to gasoline cease suddenly. The additional production costs involved amount to two to five Raps/l. The refineries will initially, because of cost and time factors, produce only regular lead-free gasoline. Lead-free gasoline will have a higher content of aromatic hydrocarbons, the benzol content can be kept below the five vol% limit, and the olefin content will be lower. Lead-free gasoline has a 25% higher smog producing tendency, and its exhaust gas contains a higher share of benzanthracene and of other polynuclear aromatic substances but the same amount of benzopyrene. Lead does not only improve the antiknock property of gasoline, but acts also as a lubricant preventing the corrosion of exhaust valve seats. Regular gasoline in the U.S.A., which beginning with 1971 will contain only 0.2 g lead/l, will reduce engine power by 10% which is no problem with high-powered engines. In Europe, however, this is a problem because most European engines with small piston displacement would lose too much power if run on regular lead-free gasoline. For this reason, the reduction of lead content in gasoline in Europe can be introduced only gradually as engines are adapted in the direction of higher piston displacement. The use of natural or of liquefied gas in automobiles should be encouraged.

15652 APTIC NO. 33427

George, Ralph E. and John E. Williamson

ON-SITE INCINERATION OF COMMERCIAL AND INDUSTRIAL WASTES WITH MULTIPLE-CHAMBER INCINERATORS. *In: Principles and Practices of Incineration. Richard C. Corey (ed.), New York, Wiley-Interscience, 1969, Chapt. 5, p. 106-162. 4 refs.*

Design standards are presented which provide the criteria for developing multiple chamber incinerators that will burn refuse with a minimum discharge of air pollutants. Two basic types of multiple chamber incinerators have been developed, the retort type and the in-line type. In both, the combustion process proceeds in two stages: primary, or solid-phase, combustion in the ignition chamber, followed by secondary, or gaseous-phase, combustion. The ignition 0mechanism must be one of fuel-bed surface combustion. This is achieved by the predominant use of overfire combustion air and minimum use of underfire air. When smoke and other combustible-effluent products pass through the flame port into the mixing chamber, secondary air must be supplied to complete combustion. Multiple chamber incinerators may operate with from 100% to 300% excess combustion air. The most important incinerator design factors include ratios of combustion-air distribution, supplementary draft and temperature criteria, ignition chamber length-to-width ratios, arch height, grate loading, and secondary combustion velocity. The use of water stray gas scrubbers in incinerator operation is discussed. Guidelines for the construction and operation of multiple chamber incinerators are also given.

15653 APTIC NO. 34269

Glass, R. W. and R. A. Ross

LOW SURFACE COVERAGE INTERACTIONS OF SULFUR DIOXIDE ON SELECTED TRANSITION METAL CATALYSTS FROM 273 TO 423 K. *Can. J. Chem., 49(17):2832-2839, Sept. 1, 1971. 25 refs.*

Calorimetric heats of adsorption for sulfur dioxide at low surface coverages from 0.004 to 0.600 micromole/sq m on a number of supported transition metal catalysts were measured at 273 to 423 K, mainly by an adiabatic technique. The catalysts included ferric oxide (Fe203), manganic oxide (Mn203), vanadium pentoxide (V205), manganese sulfate (MnSO4), and nickel sulfide (NiS), each supported on silica gel. Sulfur dioxide adsorption/desorption isotherms, nitrogen adsorption data, and chemical and infrared analyses were also determined. Heats of adsorption at 423 K for adsorbed amounts of 0.004 micromole/sq m varied with the adsorbent from nearly 39.0 for Mn203 on silica gel to 23.0 kcal/mol for the silica gel support medium. With increase in surface coverage to 0.600 micromole/sq m, the heat values began to steady at 6-7, 7-8, and 8-9 kcal/mole at 423, 373, and 323 K, respectively, and less discrimination was observed among the various materials. Pread sorption of small amounts of SO2 on the supported oxides followed by oxygen admission caused sharp initial falls of as much as 7-8 kcal/mol in the heat values, but preadsorption of oxygen followed by SO2 gave only slight increases of around 1 kcal/mol. The results suggest that SO2 is chemisorbed on all surfaces with the strongest interactions occurring at the lowest coverages. Sulfates are formed on the oxides as confirmed by chemical analysis. Presumably, hyrogen bond formation occurs on silica gel through the interaction of SO2 oxygen atoms with surface hydroxy groups. (Author abstract modified)

15654 APTIC NO. 33448

Gottschlich, Chad F.

SOURCE CONTROL BY ELECTROSTATIC PRECIPITATION. *In: Air Pollution. Arthur C. Stern (ed.), Vol. 3, 2nd ed., New York, Academic Press, 1968, Chapt. 45, p. 437-456. 24 refs.*

An electrostatic precipitator removes particles (solid or liquid) from gaseous streams by passing the gas between a pair of electrodes--a discharge electrode at a high potential and an electrically grounded collecting electrode. The potential difference must be great enough so that a corona discharge surrounds the discharge electrode. Gas ions formed in the corona move rapidly under the action of the electrical field toward the collecting electrode, and transfer their charge to the particles by collision with them. The electrical field interacting with the charge on the particles then causes them to drift toward, and be deposited on, the collecting electrode. When the particles are liquid droplets, the collected droplets coalesce on the collecting electrode and drip off the bottom of that electrode into a collecting sump; when the particles are solid, the dust layer that forms on the collecting electrode is removed by rapping to cause the deposit to break loose from the electrode. Electrical field and particle charging are reviewed. Theoretical equations which define collection efficiency are presented, and dust removal and reentrainment are considered. Dust resistivity, conditioning, and the effect of temperature on resistivity are discussed. Pressure drop and gas distribution are reviewed, and power supplies and sectionalization are noted.

15655 APTIC NO. 34082

Granville, R. A.

THE CAPITAL COSTS OF SOME WASTE-GAS CLEANING PLANTS FOR USE IN IRON AND STEELWORKS. *Iron Steel Inst., London, Spec. Rept., no. 61:23-30, 1958. 11 refs. (Presented at the Iron and Steel Institute, Air Pollution Meeting, London, England, Sept. 25-26, 1957.)*

The capital costs of control methods for emissions from various equipment and processes in iron and steel works are examined. The sources of emissions included the open-hearth furnace, emitting iron oxide fumes, scale and slag particles, and waste gases containing sulfur oxides; the sinter plant, emitting sulfur oxides and dust; electric arc furnaces; deseamers; pulverized fuel fired furnaces; crushing, grinding, and sieving plants emitting dusts. Dry and wet electrostatic precipitators, automatic fabric filters, and wet scrubbers were analyzed as controls with respect to inlet gas temperature and pressure, dust concentration, efficiency, plant capacity, and approximate costs.

15656 APTIC NO. 33450

Gross, George P., William F. Biller, David F. Greene, and Kenneth K. Kearby

METHOD OF TREATING EXHAUST GASES OF INTERNAL COMBUSTION ENGINES. *Esso Research and Engineering Co., Inc., Linden, N. J.) U. S. Pat. 3,370,914.*

15p., Feb. 27, 1968. 5 refs. (Appl. Nov. 20, 1963, 6 claims).

A method of reducing the hydrocarbon, carbon monoxide, and nitrogen oxide content of exhaust gases from internal combustion engines is described. This is achieved by catalytically effecting a redistribution of available oxygen so that carbon dioxide, hydrogen, and in some cases methane, which are harmless, are increased with the aid of water, while the harmful components are reduced. Suggested catalysts are town gas catalysts and water-gas shift reduction catalysts such as chromium oxide-iron oxide and nickel on alumina promoted with an alkali or alkaline earth metal.

15657 APTIC NO. 34163

Grunewald, Gerhard Wilfried and Gerhard Hochgesand

A PROCESS FOR REMOVING HYDROGEN SULPHIDE AND CARBON DIOXIDE FROM FUEL GAS OR SYNTHESIS GAS CONTAINING THE SAME. *(Metallgesellschaft A. G., Frankfurt (W. Germany) Brit. Pat. 1,203,103. 7p., Aug. 26, 1970. (Appl. Oct. 3, 1967, 6 claims).*

The process described consists of passing the gas under pressure through two absorption stages and contacting it in each stage with an organic scrubbing liquid at a temperature below O C. The first absorption stage removes hydrogen sulfide; the second, carbon dioxide. Each absorption stage has a regeneration stage for the scrubbing liquid.

15658 APTIC NO. 34276

Hama, Akira

DEVICE TO FIX FILTER CLOTH TO BAG FILTER. *(Baggu firuta ni okeru rofu toritsuke sochi). Text in Japanese. (Kurimoto Iron Works, Ltd., Osaka (Japan)) Japan. Pat. Sho 46-24547. 3p., Aug. 24, 1971. (Appl. Sept. 9, 1968, claims not given).*

Square bag filters are much more difficult to attach to a filter frame than tubular bag filters because the fixture used is much more complex. A new device for holding square bag filters in place permits their easy installation and removal. It consists mainly of an outer frame and an inner frame, each shaped like a rectangular wire basket. The inner frame can be divided into two or more separate units, which in turn can be assembled into one basket-like unit by hooks. The filter is installed by first placing the outer frame in such a position that only the bottom part of the filter can be inserted. A drawstring in the upper hem of the filter is then used to insert the inner frame in the filter, the lower separate unit first and then the separate upper unit (both are assembled in one unit in the filter). With the filter now securely held between the inner and outer frames, strings attached to the upper brim of the filter are tied together. Finally, the upper opening of the outer frame is fitted onto the flanged edges of the port provided in the filter-mounting chassis of the dust collector, while the bottom of the outer frame is supported by the bag filter.

15659 APTIC NO. 33578

Hasegawa, Keiji

DESULFURIZATION APPARATUS OF EXHAUST GAS, DEVELOPED BY THE SHOWA ELECTRICAL ENGINEERING CO. *(Showa denko hoshiki no haien datsuryu sochi ni tsuite). Text in Japanese. Nenryo Oyobi Nensyo (Fuel and Combustion), 38(10):19-24, Oct. 1971.*

The desulfurization system of the Showa Electrical Engineering Co., Kawasaki Plant was completed in May 1971 wherein sulfur dioxide in smoke is absorbed by sodium sulfite in the form of acidic sodium sulfite, and sodium sulfite is recovered by caustic soda. The system consists of an absorption tower where SO2 is absorbed from the smoke emitted from a 150 t/hr electric power boiler; absorbent pH which is sent to the tower; and adjustment tank where the concentration of the absorbent is controlled, and the refining system where dust and other impure matters are separated from desulfurized smoke and sodium sulfite is recovered. It is possible to add a crystallization apparatus, a crystal dryer, and a packing apparatus to this system to recover sodium sulfide in crystal form. The absorption tower is an upper countercurrent type venturi. Statistics for heavy oil are: consumption, 11,150 kg/hr; sulfur content in the heavy oil, 2.7%; smoke emission, 153,000 cu Nm/hr; smoke temperature, 170 C; SO2 in the smoke; 1350 ppm; temperature of cleaned gas at the exit, 61 62 C; SO2 content in cleaned gas, 60 ppm; operating time, 8000 hr; sodium sulfite recovery, 1020 kg/hr; caustic acid, 770 kg/hr; water, 15 cu m/hr; electricity, 350 kW/hr; personnel, 0.5/1 shift; construction cost, approximately $700,000. According to the above data, the cost for 1% desulfurization of 1 ton of heavy oil is approximately 75 cents to $1.

15660 APTIC NO. 34071

Hashimoto, Haruhiko

ON TECHNOLOGY OF UTILIZATION OF DUST FROM STEEL MAKING. *(Sangyo haikibutsu dearu seiko enjin no shigenka gijutsu ni tsuite). Text in Japanese. Preprint, Reutilization of Resources Technical Assoc. (Japan), 5p., 1971. (Presented at the Seminar on Reutilization of Resources Technology, 2nd, Japan, July 12-14, 1971.)*

A process is described which uses the dust from the production of steel for the smelting of zinc and lead. The dust collected from open hearth or electric furnaces is too fine for reclamation and, if not handled properly, may be the cause of secondary pollution. It contains too many other metals to be suitable for a raw material in the production of steel or nonferrous metals. However, taking advantage of the fact that most of the valuable metals in the dust are oxides and, utilizing the difference in pressure of these metals, zinc and lead have been successfully recovered to avoid secondary pollution. The dust is pelletized, and the appropriate amount of reaction controlling reagent and coking coal are mixed before being charged into a rotating kiln. Foreign bodies such as scrap iron and fire-proof refractory materials should be eliminated from the dust before processing it. A special method is described to eliminate the accretion of materials in the rotating kiln to improve its operating efficiency.

15661 APTIC NO. 33586

Hayashi, Kiyomo

DESULFURIZATION METHOD AND APPARATUS FOR HYDROCARBON OIL. *(Sekiyu tanka suisoyu no datsuryu-ho oyobi sore ni shiyo suru sochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 46-31145. 5p., Sept. 9, 1971. (Appl. Nov. 19, 1969, 2 claims).*

Hydrocarbon oil with high sulfur content and hydrogen gas are injected into molten metal with low melting point, in which small particles of molybdenum containing a desulfurization catalyst are dispersed. This method enables the material oil to come into contact with the catalyst at a low temperature between 300 and 500, without the usual use of a carrier. Because the catalyst itself is dispersed in the hot, molten metal catalyst, the usual rapid deterioration of catalytic activity is prevented, enabling an effective desulfurization at a low cost. The second claim consists of a pressure-resistant reaction chamber with molten metal, containing dispersed catalyst, and a device for injecting material oil and hydrogen gas into it. Inside the chamber is a concentrically placed open cylinder, the top of which is lower than the surface of the melted metal and the lower end is higher than the bottom of the metal. In the lower part of the reaction chamber are two nozzles directed toward the molten metal inside the cylinder, into which hydrogen gas and material oil will be injected. Receptacles for emitted gas and desulfurized oil are attached at the top of the reaction chamber. The apparatus enables a continuous desulfurization processing.

15662 APTIC NO. 33984

Hayashi, Ko

MINIATURIZATION OF ELECTROSTATIC PRECIPITATOR AND ITS APPLICATION. *(Denki shujin sochi no kogataka to sono oyo). Text in Japanese. Nenryo Oyobi Nensho (Fuels and Combustion), 38(11):1091-1097, Nov. 1971. 2 refs.*

Principles of electrostatic precipitators are explained and an improved, miniaturized precipitator is introduced. Needle type discharge electrodes of less than 0.2 mm phase are attached at the end of the discharge electrode sheet. Corona discharge occurs at the tips of needles at a relatively low voltage. Dusts do not collect on the needles and do not impair corona discharge, therefore rapping is not necessary. The rapping device may be completely eliminated when the precipitator is washed for maintenance. A static electric field lies underneath the discharge needles. Positive and negative electrodes stand with an equal distance between them, and the tips of needles become inequal electric field. Dust particles which pass at a less than 1/100 sec speed become ionized positively and enter the static field where they are rapidly adsorbed by the negatively charged dust collection board. The ionized portion and discharge electrode are one extended and stabilized board completely disconnected from the opposing dust collection electrode board, therefore short circuits or breaking of wires do not occur.

15663 APTIC NO. 33413

Hayashi, Taro and Aritsune Moriyama

GAS PURIFICATION APPARATUS USING LIQUID FILMS. *(Ekitaimaku ni yoru gasu seijoka sochi). Text in Japanese. (Sanko Air Apparatus Co., Ltd., Osaka (Japan)) Japan. Pat. Sho 46-25990. 2p., Sept. 7, 1971. (Appl. Dec. 2, 1968, claims not given).*

Previous gas cleaning devices using liquid films usually injected gas into liquid film, or through the liquid. This invention injects gas paralleling the flow of the liquid film, thus prolonging the duration of the gas-liquid contact and absorption action. The invention also includes the use of a guiding valve and a guiding rod, which adjust the thickness of liquid film and absorption efficiency according to the nature of the gas, and controls the transmission pressure.

15664 APTIC NO. 33419

Hayashida, Motoyuki

PURIFICATION DEVICE FOR ENGINE EXHAUST GAS. *(Enjin no haiki gasu joka sochi). Text in Japanese. (Toyo Kogyo Co., Ltd., Hiroshima (Japan)) Japan. Pat. Sho 46-25957. 2p., Sept. 7, 1971. (Appl. Aug. 2, 1968, 1 claim).*

The device improves the type of engine which supplies fresh air into the engine in order to burn toxic gas element more completely. A sleeve made of a heat-resistant, relatively nonconductive material is inserted in the engine case, forming an insulating air chamber in the back of the exhaust duct. This will keep the temperature of exhaust gas from dropping while flowing, thus making a more complete combustion possible.

15665 APTIC NO. 33585

Hedden, K.

PROCESS SELECTION AND CONDUCTION. *(Verfahrensauswahl und-fuehrung) Text in German. Tech. Mitt., 64(9):365-374, Sept. 1971.*

Due to the ever-increasing size of chemical plants, pollution of the environment would increase if no control measures were taken. The most important air pollutants produced by the chemical industry are hydrogen sulfide, fluorine-containing gases, sulfur dioxide, and nitrogen oxides. Compared to the total daily emission of 10,000 tons of SO2 in Germany, the emission by chemical plants (mainly Claus furnaces) of 100 tons is minor. To prevent neighborhood pollution by the gases, high stacks must be built or the SO2 must be removed from the flue gas. Absorption on activated coke removes 90% of the SO2. Through heating with hot sand, the SO2 is liberated from the coke. It can be used for production of sulfur acid or be recirculated to the Claus furnace. The nitrogen oxides developing in the production of nitric acid are most efficiently removed by low-temperature treatment. In the production of highly concentrated nitric acid (99%) by the oxidation method, the nitrogen oxide gases are washed out at cold temperatures. The nitric oxide and nitrogen dioxide are reduced to a residual concentration of 100 ppm instead of the 1000 ppm normally contained in the waste gas.

15666 APTIC NO. 33841

Heinicke, G. and R. Paudert

TRIBOCHEMICAL EFFECTS IN TECHNOLOGY (IV). TRIBOMECHANICAL TREATMENT OF SOLID BODIES - A METHOD FOR THE PRODUCTION OF ACTIVE CATALYSTS. PART I. *(Tribochemische Wirkungen in der Technik (IV). Tribomechanische Beanspruchung von Festkoerpern - eine Methode zur Herstellung aktiver Katalysatoren (Teil I)). Text in German. Technik (Berlin), 26(10):643-648, Oct. 1971.*

Tribomechanical treatment of oxide catalysts in numerous cases caused an increase of the catalytic activity with the duration of the grinding process. As an example, the speed of the sulfur dioxide oxidation by an alpha ferric oxide catalyst is graphically illustrated. The activity of the catalyst is greatest when the grinding process lasts 20 min. At the same time, the reaction temperature at which the highest SO2 conversion takes place is shifted to lower temperatures (between 500 and 600 C). The same results are achieved with a vanadium oxide catalyst. If the grinding process lasts longer than 20 min, the catalytic activity recedes. Grinding of the V205 catalyst for a period of 1200 min reduces the activity of the catalyst so much that it drops below that of the unground sample. This is caused by the resulting lattice defects being reduced by a recovery process. The activity was a function of the lattice defects.

15667 APTIC NO. 33467

Helden, Henricus Johannes Antonius Van

CATALYTIC REDUCTION OF SULPHUR DIOXIDE TO HYDROGEN SULPHIDE. *(Shell Internationale Research Maatschappij N. V. (The Netherlands)) S. African Pat. Appl. 681,298. 13p., Jan. 16, 1968. (18 claims).*

Processes exist for removing sulfur dioxide from flue gases by means of a solid acceptor, followed by regeneration of the loaded acceptor with a reducing gas, and the processing of the SO2 formed in the regeneration to elemental sulfur. The catalytic conversion of the SO to hydrogen sulfide is desirable in the last phase, but known catalysts require high temperatures (593-705 C) for the reaction and low space velocities (50-500 volumes of feed/volume of catalyst/hr). A vanadium oxide catalyst on a bauxite, synthetic alumina, and/or silica-alumina carrier enables the conversion to be carried out in the presence of free or combined hydrogen at 300-600 C, i.e., the temperatures at which the SO2-containing gases become available from the regeneration of the acceptor, and at space velocities between 500 and 1500 volumes of the gaseous mixture/volume of catalyst/hr. The preferred acceptor for the first phase of the reaction is copper oxide. Because high space velocities can be applied, the size of the reactor used for the reduction of SO2 can be small. Moreover, the catalyst easily causes the reduction of all the SO2, preventing the untimely formation of elemental sulfur with the hydrogen sulfide produced

15668 APTIC NO. 33998

Higuchi, Masataka

BAG FILTER DUST COLLECTOR. *(Baggu shujin sochi). Text in Japanese. (Japan Spindle Mfg. Co., Amagasaki*

(Japan)) Japan. Pat. Sho 46-33876. 3p., Oct. 4, 1971. (Appl. Dec. 12, 1968, 1 claim).

Filtered air is led from each dust collection chamber where a number of bag filters are installed to a control device which detects damage in the bag filters and gives an early warning to prevent a major accident. A magnetic rotary valve rotates and leads the air from each filtering chamber to the control device. Standard clean air is also led to the control device where two kinds of air go through transparent tubes and the dust concentration of each air is photoelectrically detected and compared. If an extraordinary concentration occurs in the filtered air due to breakage of a bag filter, the equilibrium bridge would convey the photoelectric detection to an amplifier which automatically operates the warning lamp or a buzzer.

15669 APTIC NO. 33418

Hirayama, Kenichi

AIR CLEANING APPARATUS. *(Kuki seijo sochi). Text in Japanese. (Mitsubishi Electric Appliances Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 46-25988. 2p., Sept. 7, 1971. (Appl. Dec. 20, 1968, claims not given).*

Filters that have collected dusts from the air are conveyed by moving chains and guide rollers, and then stored in the lower portion of the apparatus. The invention consists of a device of separating the chains from the guide rollers in order to prevent accumulation of dust and rusting of the chain.

15670 APTIC NO. 33583

Hirose, Masanao

DISPOSAL TECHNIQUES OF PLASTIC WASTES AND THEIR ECONOMIC SIDES. *(Purasuchikku haikibutsu shori gijutsu to sono keizaisei). Text in Japanese. PPM Japan, 2(9):50-57, Sept. 1971. 6 refs.*

Incineration, regeneration and utilization, and microbic methods are described for the dispoal of plastic wastes. For incineration, the plastics are first shredded, and iron and other magnetic metals are removed before pretreatment at 280 C to decompose and carbonize vinyl chloride. Hydrogen chloride is neutralized with ammonia to form ammonium chloride which is then separated and collected. The recovered ammonium chloride can pay for the operating costs, while heat from the combustion process can also be utilized. For the regeneration of plastics, a portion of the wastes is shredded to a powder, then mixed with a small quantity of new plastics; they can also be processed and reshaped for the manufacture of construction materials. Osaka University has recently announced a process in which polyethylene and polyvinyl chloride wastes are heated at 400-500 C and catalytically decomposed, then treated as above to recover gasoline and kerosene. Aspergillus glaucus var. tonophilus and five other strains of microbes have been experimentally used to treat polyurethane.

15671 APTIC NO. 34075

Honda, Atsuhiro

PROBLEMS OF PLASTICS WASTES DISPOSAL. *(Purasuchhiku haikibutsu shori no mondaiten). Text in Japanese. Kagaku to Kogyo (Tokyo) (Chem. Chem. Ind.), 45(4):34-35, April 1971.*

Plastic production in Japan totaled 4.405 million tons in 1969, and the percentage for various uses is indicated. In order to avoid the generation of smoke and obnoxious odors from burning plastics, temperatures must be more than 700 deg, while the heat generated must be more than 800 kcal/kg. Because the calorific value of plastics has increased from what it was in 1958-1960, temperatures very often now exceed 1000 C, thus causing damage to the metal parts of incinerators. The burning of plastics also contributes to the presence of hydrochloric acid in the atmosphere. Incinerator repair costs have increased from two percent to 406% of the construction cost; the life of the incinerator has decreased from 15 years to seven years. Therefore, it may be necessary to require separate collection and disposal of plastics. As plastics do not disintegrate, their use for land filling has not been entirely satisfactory. Crushed plastics together with soil improving chemicals are expected to improve plant growth.

15672 APTIC NO. 34295

Inagaki, K.

THE PRESENT STATE OF STACK GAS DESULFURIZATION TECHNICAL DEVELOPMENT. *(Haien datsuryu gijutsu kaihatsu no genjo). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 1-7, 1971. (Presented at the Discussion on Desulfurization Techniques, 4th, Yokkaichi, Japan, Oct. 20, 1971.)*

The amount of heavy oil imported by Japan is 180 million kl, 80% of which consists of oils with large sulfur content from Near East. Approximately 18 million tons of sulfur oxides per year are emitted by combustion of the oil. Among various abatement methods, desulfurization of stack gas is effective for combustion of asphalt oil and high sulfur content heavy oil. Various dry and wet methods of desulfurization are reviewed. A new desulfurization oxidation catalyst was developed. This oxidation catalyst is fixed on adsorbents such as activated carbon, alumina, bentonite, or zeolite, and approximately 100% desulfurization result is obtained. Ninety percent is achieved in the initial 0.05 second contact as compared to seven to eight minutes by activated carbon. The temperature of stack gas does not drop at all within the range of normal temperature up to 550 C. Nitrogen oxides can also be eliminated by approximately 100%. The flow sheet and operation variables of a system using the new catalyst are presented.

15673 APTIC NO. 33967

Inoue, Reijiro

DUST COLLECTORS. *(Dasuto corekuta ni tsuite). Text in Japanese. Sangyo Kogai (Ind. Public Nusiance), 7(10):581-582, Oct. 1971.*

A dust collector with more than 99.9% collection efficiency is connected with a 60 ton arc furnace with the maximum oxygen suction of 45 N cu m/min and with two other dust collectors by ducts. When suction capacity becomes insufficient, the other collectors adjust the suction power. The air requirement is 3500 cu m/min and the filtering area is 4300 sq m. The shell structure is greatly simplified; only the lower hopper is air tight, and the bag filter is protected from the rain; both maintenance and inspection can be carried out simply. Noise suppression is relatively easy, since the noise of the fan is almost eliminated by the bag filter silencer. The air coming out of the bag filter can be discharged in the air without stacks. Suction ducts from the collector to the blower are also unnecessary. The suction adjustment damper opens annd closes automatically, adjusting to the change of pressure. The exhaust damper opens and prevents an explosion when the blower stops or power fails. The cold wind damper opens automatically when an extraordinarily hot gas flows in, thus preventing the bag filter from burning.

15674 APTIC NO. 33834

Ishii, Yajiro

FILTER DUST COLLECTORS OF MIKKAICHI REINERY. *(Mikkaichi seirensho no rokashiki shujin ni tsuite). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 7(10):595-599, Oct. 1971.*

Fourteen bag-filter type dust collectors are used at the Mikkaichi zinc refining plant covering a total filtering area of 21,000 sq m. The main emission sources are the sintering, fraction, and refining plants. For the sintering process, bag filters of a total capacity of 7000 N cu m are installed at the joints of belt conveyors, van conveyors, bucket elevators, and the ducts of the shifting and kneeding machines. The filtering surfaces are designed for 0.7 1.0 cu m/sq m; ducts are designed for 15 20 m/S for main pipes and 10 -15 m/S for branch pipes. Filter materials are tetron fibers for 100 C air, and glass-cross fibers for air around 250 C. When the joints of conveyors cannot be closed air-tight, free air suction is suppressed by the use of a slit type or a hood type suction entrance. The suction entrance of the first sinter-crushing process is designed to accommodate greatly varying temperatures. At the electric furnace plant, the emission gas from the preheating furnace is extremely hot and contains much dust; the gas is cooled by a water cooling jacket down to 100 C and is sent to the bag filter. The combustion gas of the electric furnace is also cooled by a jacket air duct and a separate cooling system and sent to the filter. In the refinery, approximately 1000 N cu m bag filters are located in various points; the emission gas is cooled by a heat exchanger, mixed with a lower temperature gas, and is sent to the filter.

15675 APTIC NO. 34073

Ito, Norio, Masao Shimoda, and Hideo Takahashi

EFFECTIVE SLUDGE TREATMENT TECHNIQUE AND ITS COST. *(Hedero no kokateki shori gijutsu to sono hiyo). Text in Japanese. PPM (Japan), 2(9):58-61, Sept. 1971.*

Quicklime is an effective agent for the treatment of sludge containing hydrogen sulfide. When the flow velocity of the H2S is five l/min or lower, 250 ppm H2S can be reduced to 0 ppm. The H2S gas can be completely absorbed when the ratio of the thickness of the quicklime layer to the flow velocity is larger than or equal to three. X-ray diffraction analysis of the quicklime after absorbing the H2S confirmed the formation of slaked lime and calcium sulfide. The odor peculiar to H2S gas was completely removed when 100 g quicklime were added to 10 kg sludge, then stirred at 50 rpm for five min. One ton of quicklime is enough to control half a million cu m of sludge.

15676 APTIC NO. 34004

Iwaki, Takayuki

PRACTICALITY OF HEAVY OIL DESULFURIZATION. *(Juyu datsuryu no jitsuyo-sei). Text in Japanese. Preprint, Japan Industrial Newspaper Co., Tokyo, 13p, 1971. (Presented at the Seminar on Air Pollution Control, Tokyo, Japan Sept. 1971.)*

General low sulfur fuel policies, heavy oil and sulfur content, methods of desulfurization of heavy oil, principles of hydrogenation of heavy oil, costs of hydrogenation, problems, and trends in the future are reviewed with the use of tables and diagrams. The goal for the use of low-sulfur content fuels for 1973 and its breakdown are: for areas requiring control measures, 99.4 mil kl of 1.2% sulfur content fuel; for mining, home, and other local fuel demands, 1552 mil kl of 1.5% sulfur content fuel, and for all other fuel demands including agricultural and forestry, marine, transportation, and ships 1778 mil kl of 1.7% S content fuel will be necessary. The fuel supply plan break down is: a domestic supply of 144.2 mil kl heavy oil with average 1.9% S content; 30.2 mil kl of 1.0% S content and 2.0 mil kl of 1.5% S content oil, and 1.4 mil kl of liquid natural gas are to be imported. At the present time, an estimate for the installation of an indirect desulfurization facility is approximately $10,536,000, and the annual operation cost is approximately $6,441,000. The operational cost/kl of original heavy oil is $2.454. An estimated cost for the installation of a direct desulfurization system is approximately $22,860,000, and the operational estimate is $14,238,000; the operational cost estimate/kl of heavy oil is $5.442.

15677 APTIC NO. 33359

Jackson, Walton S.

POLLUTION AND THE CLINKER COOLER - PART II. THE APPLICABLE EMISSIONS CONTROL EQUIPMENT. *Pit Quarry, 64(2):82-87, 92, Aug. 1971.*

Control equipment for cooler vent emissions are reviewed for industries that require cooling on a grate cooler as part of their processes. The maximum temperature of the cooler vent gases, needed to calculate the maximum value to be vented, affects the choice of materials in the collector. For existing precipitator designs, 375 F is the highest temperature used for calculation of volume requirements. Glass cloth filters can handle a maximum temperature of 550 F. Nomex felt can tolerate temperatures up to 400 F. Control equipment used for grain loading during kiln upset, cement installations, and kilns is reviewed for efficiency, strength, design modifications, performance and capacity. Manufacturers are supplied for the control equipment.

15678 APTIC NO. 33386

Jagel, K. I. and F. G. Dwyer

HC/CO OXIDATION CATALYSTS FOR VEHICLE EXHAUST EMISSION CONTROL. *Proc. Am. Petrol. Inst., Div. Refining, vol. 51:169-185, 1971. 9 refs. (Presented at the American Petroleum Institute, Division of Refining, Midyear Meeting, 36th, San Francisco, Calif., May 12-14, 1971.)*

Hydrocarbon and carbon monoxide oxidation catalysts having good catalytic activity, stability, and improved physical durability were developed. Based on laboratory tests, these catalysts are predicted to be able to meet the Inter-Industry Emission Control Program HC and CO emission levels and the durability goals in vehicles in which HC, CO, and oxides of nitrogen goals are achieved simultaneously. The development of these catalysts has been aided by a mathematical model of the catalytic converter, and by some unique experimental techniques. Laboratory tests were complemented by several vehicle durability evaluations which have shown that although the IIEC goals were met initially, they were often exceeded after mileage accumulation. The principal causes for not meeting the goals have been catalyst loss due to inherently low catalyst attrition resistance and inter-particle abrasion caused by inadequate converter design. Improved converter designs and more attrition resistant catalysts have resulted in significant improvements in on-the-road durability of these systems. Laboratory tests predict that some of these catalysts will meet IIEC HC and CO goals for more than 12,000 miles with leaded fuel (3.0 g Pb/gal) and that a larger number will meet these goals for 50,000 miles with low leaded fuel or unleaded fuel. (Author abstract modified)

15679 APTIC NO. 33388

Jaimee, A., D. E. Schneider, A. I. Rozmanith, and J. W. Sjoberg

THERMAL REACTOR - DESIGN, DEVELOPMENT AND PERFORMANCE. *Proc. Am. Petrol. Inst., Div. Refining, vol. 51:207-240, 1971. 20 refs. (Presented at the American Petroleum Institute, Division of Refining, Midyear Meeting, 36th, San Francisco, Calif., May 12-14, 1971.)*

Thermal reactor systems have been designed to assist in the development of a low emission concept vehicle to meet exhaust emission goals of 0.82 g/mile hydrocarbon, 7.1 g/mile carbon monoxide, and 0.68 g/mile nitrogen oxides established by the Inter-Industry Emission Control Program. The reactor includes design features required for acceptable life characteristics, together with quick warm-up necessary to achieve the emission targets. Exhaust gas recirculation and enriched carburetion are used to reduce the oxides of nitrogen. Associated problems defined during development of several thermal reactor systems are described. The primary problem was achieving durability at the typically high operating exhaust gas temperatures (1600-1800 F) necessary for concurrent HC, CO, and NOx control. Fuel additives such as lead, halogen scavengers, phosphorus, and sulfur were studied extensively under thermal cycling engine operating conditions to determine their effects on material durability. Acceptable corrosion control of potential reactor materials will require the use of an unleaded or low-lead (0.5 g/gal) fuel. (Author abstract)

15680 APTIC NO. 33938

Jarosz, Adam

DESULFURIZATION OF GASES BY THE THYLOX WET METHOD WITH SIMULTANEOUS RECOVERY OF SODIUM THIOSULFATE. *(Odsiarczanie gazu na drodze mokrej metoda Thylox z rownoczesnym otrzymywaniem tiosiarczanu sodowego). Text in Polish. Przemysl Chem., 41(10):5671, 1962. 3 refs.*

The Thylox method, first used in the U. S., then in Germany, Japan, and the USSR, was first introduced to Polish industry in the postwar era. A nitrate plant at Tarnow, which generates 100 cu m gas/hr, provided the first opportunity in Poland for a study of the desulfurizing performance of the method. The basic principle is absorption of hydrogen sulfide in a solution prepared by dissolving arsenic in sodium or ammonium carbonate. Studies were conducted in a pilot plant which was run continuously for all three workshifts over a 5-month period. In addition to the usual two stages of the process, that which absorbs the H2S and that which regenerates the solution by oxidation, an additional absorber was added to absorb the sulfur dioxide, this being bathed with a 20% sodium carbonate solution. The generator gas passed to the scrubber for removal of H2S contained 2.8 grams sulfur/cu m in the form of H2S and 0.06 grams sulfur in the form of SO2. The gas that emerged from the scrubber contained less than 20 mg sulfur/cu m. The liquid solution circulated at the rate of 1.5 cu m/hr, contained an arsenic oxide concentration of 5 grams/l and a sodium carbonate concentration of 6.6 grams/l. The temperature of the solution was 35-40 and its pH on emerging from the absorber was 7.8-7.9.

15681 APTIC NO. 33949

Jonke, A. A., G. J. Vogel, L. J. Anastasia, and R. L. Jarry

WORK PLAN FOR CONTINUATION OF THE PROJECT REDUCTION OF ATMOSPHERIC POLLUTION BY THE APPLICATION OF FLUIDIZED-BED COMBUSTION. *Argonne National Lab. Ill., Chemical Engineering Div., Atomic Energy Commission Contract W-31-109-Eng.-38, 38p., April 1971. 26 refs.*

NTIS: ANL/ES-CEN-1003

A program history and work plan are presented for a project on the reduction of atmospheric pollution by the application of fluidized-bed combustion. By using the one-stage fluidized-bed combustion concept, in the presence of additive, greater than 95% of the sulfur dioxide was removed from the flue gas; nitric oxide emissions were reduced by 20-40% (to less than 300 ppm) during coal combustion and to the thermodynamic equilibrium limits of approximately 80 ppm during the combustion of natural gas; emission of particulate material of less than or equal to 5 micron in diameter was reduced. Exploratory experiments using the two-stage combustion concept achieved an NO concentration of approximately 70 ppm in the flue gas and removed over 90% of the sulfur. The most significant variables affecting SO2 removal were combustion temperature, Ca/S mole ratio in the feed streams, and the superficial fluidizing-gas velocity. Less significant were type and particle size of additive, coal type, height of fluidized bed, and oxygen content of flue gas. Reduction in NO emissions was affected by the presence of limestone or dolomite in the fluidized bed during the combustion of coal. The future experimental program will include the completion of study of the effects of variables for one-stage combustion at 1 atm pressure; determination of the effect of independent variables on SO2 removal, NO level, and particulate emission; construction of a bench-scale plant for operation at pressures up to 10 atm to study the effects of variables in one and two-stage high-pressure combustion and regeneration of the partially sulfated additives from the one and two-stage operations. Studies to define the mechanisms involved in these reactions will also be continued.

15682 APTIC NO. 33947

Juentgen, H.

POSSIBILITIES OF LIMITING SULFUR DIOXIDE EMISSIONS. *(Moeglichkeiten zur Begrenzung von Schwefeldioxid-Emissionen). Text in German. Chem. Anlagen Verfahren, 11:82-84, 87, Nov. 1969. 16 refs.*

Sulfur dioxide emissions can be reduced by using fuels with low sulfur content, by desulfurization of fuels before use by building high stacks, and by desulfurization of flue gases. Refineries have taken advantage of the first alternative and are now importing heavy heating oils with 2.2% sulfur content instead of the former 2.5 to 3%. Also, in contrast to American anthracite, German anthracite contains only 1.1% sulfur. Power plants now routinely build 200 to 240-m smokestacks; however, this technique does not reduce emissions, but rather only disperses them. Desulfurization of oil is technically feasible by catalytic treatment of residual oils with hydrogen at high pressure and temperature. Sulfur is reduced to H2S which is further processed to elementary sulfur. Coal contains sulfur in the form of pyrite and organic sulfur compounds. Sulfur from pyrites (40-50% of total sulfur) can be partially removed (depending on the distribution of the pyrites) without changing the structure of coal by mechanical and magnetic methods. Organic sulfur can be removed only by coking or gasification. No satisfactory method exists yet for the large-scale desulfurization of waste gas because of the large volumes of gases to be treated, the low SO2 concentrations (0.2% by volume and less), and the stringent requirements of the possible desulfurization methods. The emphasis of current research and development work is on the catalytic oxidation of SO2 to SO3 and subsequent SO3 removal, the chemical conversion of SO2 by means of solids dispersed in the gas in dry state and their subsequent separation by dust arresters, and the adsorption of SO2 on carbonaceous adsorbents.

15683 APTIC NO. 33434

Kalagina, T. A. and V. A Klevke

PURIFICATION OF EFFLUENT GASES FROM NITROGEN OXIDES IN THE PRODUCTION OF NITRIC ACID. *(Ochistka ot okislov azota vykhlopnykh nitroznykh gazov azotnokislykh proizvodstv). Text in Russian. Zh. Vses. Khim. Obshchestva im D. I. Mendeleeva, 14(4):410-415, 1969. 45 refs.*

Two methods for removing nitrogen oxides from the effluent gases of nitric acid production are discussed: removal by solid or liquid substances (adsorption and absorption), resulting in conversion to either HNO3, concentrated nitrogen oxides, or nitrates; and catalytic reduction to nitrogen. Absorption and adsorption do not satisfactorily solve the problem of liquidation of the harmful exhausts of HN03 production, although they do result in higher yields by the recovery of nitrogen oxides from effluent gases. When the most effective methods are employed, the lowest attainable concentration is .04-.02% NO2 by volume. Of the various methods, the only adsorption on silica gel appears to be promising feasible with current production technology, although, it has not yet been tested on an industrial scale. Catalytic reduction of nitrogen oxides appears most desirable, especially when sanitary aspects of the problem are considered. Catalytic reduction may be added as a last step in multi-ton HNO3 production. The heat released in the course of the reduction can be used in the production process. Some problems connected with providing existing plants producing HNO3 with equipment for catalytic reduction of nitrogen oxides are discussed.

15684 APTIC NO. 33356

Kaleskas, Edward W.

WPI GROUP USES PROPANE AND CATALYTIC CONVERTER TO PRODUCE CLEAN-BURNING VEHICLE. *SAE (Soc. Automot. Engrs.) J., 79(10):44-45, Oct. 1971.*

A six-passenger sedan, equipped with propane fuel, catalytic converters, and a modified ignition timing was tested for emissions of hydrocarbons, carbon monoxide, and nitrogen oxides at varying air-fuel ratios, timings, and speeds. The stepdown in timing was efficient in decreasing NOx levels, but the lean mixtures caused the engine to misfire on deceleration and to pass raw fuel into the exhaust. To overcome this, the idle speed was increased, but the hydrocarbon emission still exceeded the 1975 standards. Catalytic converters added to the exhaust system reduced the levels of NOx, HC, and CO below the standards. Results of test drives and engine modifications are included.

15685 APTIC NO. 33724

Kanda, Kamekichi

SOOT PURIFICATION APPARATUS IN STACKS. *(Entotsu ni okeru baien no joka sochi). Text in Japanese. (Tokai Engineering Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 46-19341. 3p., May 31, 1971. (Appl. Dec. 18, 1968, 1 claim).*

Soot cleaning apparatus, a casing attached to a smoke stack, includes a lower air suction device; a spherical container with air holes and a wind mill; an upper air suction device; a rotating screen operated by a motor, axes, a gear, and a chain; a lower water tank and an upper water tank with a water spray pipe and a funnel-type spray at the bottom; an upper wind mill; a pumping pipe; and a waste water pipe leading into a purifier tank. Smoke is purified as it goes through the device and is emitted pollutant-free.

15686 APTIC NO. 33317

Karlson, Ross S., Donald E. Valentine, and Warren E. Snyder

THE AMERICAN BOSCH MODEL 100 FUEL INJECTION PUMP. *Preprint, Society of Automotive Engineers, Inc., New York, 6p., 1970. (Presented at the Combined National Farm, Construction and Industrial Machinery and Powerplant Meetings, Milwaukee, Wis., Sept. 14-17, 1970, Paper 700696.)*

The Model 100 single plunger pump is intended to serve both the present and future medium horsepower, high speed diesel engine market. The pump performs two functions simultaneously: it pumps fuel as it is driven upward by a conventional cam in reciprocating motion, and it directs the discharge line to the next as it is rotated by a gear train. New and improved features include a pressure-balanced plunger in the hydraulic head, a new constant phase servo lock internal timing device, and an Oldham plunger drive. The pump includes an excess fuel device for improved starting. Available accessories include an electric or Bowden wire shutoff, a single level control including mechanical shutoff, a manifold pressure-actuated smoke limiting device, and a tachometer drive take-off provision. The device, which provides increased fuel for starting and reduces fuel during periods where insufficient manifold pressure is available, provides for smoke-free acceleration during any period when the turbocharger speed is not up to that required to provide normal manifold pressure.

15687 APTIC NO. 33391

Kato, M., C. Jo, M. Yoshida, and T. Tsuchida

NOX CONTROL AND PERFORMANCE OF SMALL AUTOMOTIVE 4-CYCLE GASOLINE ENGINES. *(Jidoshayo kogata 4-saikuru gasorin kikan no NOx taisaku to kikan seino). Text in Japanese. Preprint, the Society of Automotive Engineers of Japan, Inc., Tokyo, p. 89-94, May 1971. 3 refs. (Presented at the Society of Automotive Engineers of Japan, Academic Conference, Tokyo, Japan, May 1971).*

Studies were made on exhaust gas recirculation (EGR), which is an effective control method of nitrogen oxides. A 1300 cc, four cycle-four cylinder gasoline engine with some adjustments was used for the experiments. The air suction and EGR quantity were measured by a laminar flowmeter. The temperature of the exhaust gas was lowered by a heat exchanger, and after filtering through once, passed through the flowmeter. An indicator diagram analysis was carried out on a No. 4 cylinder. The suction air was stabilized, and the air-fuel ratio, circulation rate, and ignition progress angles were varied for the experiments. When exhaust gas was recirculated and ignition torque was increased to the maximum, engine power was increased under certain operating conditions, and fuel consumption was decreased. In order to clarify the cause, the same cycle tests were given with and without EGR. When exhaust gas was recycled, the maximum temperature was lower, but the maximum pressure was somewhat higher than when EGR was not carried out. According to the indicator diagram, EGR had the same effect as having the octane value of combustion improved.

15688 APTIC NO. 34029

Kawai, Sumio

DUST COLLECTOR-DEODORIZER FOR ANIMAL EXCRETA DRYER EXHAUST. *(Dobutsu fun kansoki ni shiyo suru haiki no jojin dasshu sochi). Text in Japanese. (Okawabara Mfg. Plant, Yoshida-machi, Shizuoka (Japan)) Japan. Pat. Sho 46-33662. 3p., Oct. 2, 1971. (Appl. Nov. 15, 1968, 1 claim).*

The dust removal and deodorizing of the exhaust gas from an animal excreta dryer is achieved using a cyclone equipped with an inner cylinder located in the center of the outer cylinder and connected to the exhaust pipe, and a burner attached to the inner cylinder. The exhaust gas is blown into the outer cylinder where dusts are collected by the difference in centrifugal force, and then is led into the inner cylinder where it is deodorized by burning and thermal decomposition of the odor components.

15689 APTIC NO. 33832

Kawai, Tatsuhiko

FILTER TYPE DUST COLLECTORS--ACTUAL EXAMPLES. *(Rokashiki shujin sochi ni tsuite). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 7(10):600-603, Oct. 1971.*

The dust collection chambers of a bag filter type should be separated; checking of each room without stopping the total operation should be possible. A temporary treatment should be possible with the use of a bypass without stopping suction. Before designing a bag filter dust collector for sintering dusts, the distribution of particle sizes was examined. An average 15 g/N cu m dust from the sintering process contains 7% of less than five micron dusts, 25% of 5 20 micron dusts, 48% of 20 - 60 micron dusts, and 20% of more than 60 micron dusts. The 7% of less than five micron particulates actually represents the weight percentage and a considerable quantity of minute dusts. Therefore, in designing a bag filter, the possibility of clogging filter holes had to be considered. In order to eliminate large size dusts which would damage the filter, a produster precipitation chamber was installed in front of the bag filter. A box chamber was set in the middle of the dust duct, and the gas flow speed was dropped considerably, allowing large, heavy particles to drop. The filter cloth was chosen with regards to its wear resistance, dust separatability, heat resistance, and general durability. Since the sintering dust contained dry, small particulates, relatively small mesh filter cloths of tetrone and glass fibers were used. Other design criteria for the hopper, dust discharge feeder, dust box, and air ducts are described.

15690 APTIC NO. 33678

Kikuchi, Yoshio

MIST SEPARATION APPARATUS. *(Misuto bunri sochi). Text in Japanese. (Hitachi Ltd., Tokyo (Japan)) Japan. Pat. Sho 46-27730. 3p., Sept. 23, 1971. (Appl. April 5, 1968, 1 claim).*

A number of crescent shaped pipes are interlocked together forming meandering narrow channels. Air-liquid mixture in gaseous form flows through these channels and creates a number of whirlpools caused by the irregular openings. Due to the difference in specific gravities, the mist that collides into concave walls will fall along the wall into the recepticles that are attached at the lower end of the pipes.

15691 APTIC NO. 34223

Kimball, David V.

INERTIAL DEPOSITION EFFICIENCY OF RECTANGULAR COLLECTORS IN A TURBULENT BOUNDARY LAYER. *Edgewood Arsenal, Md., Chemical Research Lab., Projects 1B562602A060, ITO61101A91A, TR-EATR 4391, 35p., April 1970. 6 refs.*

The inertial deposition efficiency of rectangular collectors in a wind tunnel was studied. Dioctyl phthalate droplets (56, 63, 75, 81, 98, and 128 micron in diameter) were collected at a 10-mph airflow. The collectors had three-inch by six-inch sides that faced the airflow and lateral dimensions of 1.6, 3.2, or 6.4 in. Forward deposition efficiency was directly proportional to particle diameter and lateral dimension of the collector, but the efficiency was not uniform over the collector side facing the flow. Efficiency was greatest in the middle of the face and decreased toward the top and bottom. Total deposition efficiency on collector top, sides, and back was less than 10% of total forward deposition. (Author abstract modified)

15692 APTIC NO. 33698

Kimura, F., N. Ogata, S. Mitsukoshi, and T. Kokubu

COLLECTION EFFICIENCY OF PARALLEL FIBROUS FILTERS. *(Heiko hairetsushiki sen i-so firuta no hoshu koritsu). Text in Japanese. Preprint, Japan Society of Chemical Engineers, Tokyo, p. 23-24, 1971. (Presented at the Japan Society of Chemical Engineers, Autumn Conference, 5th, Osaka, Japan, Oct. 1971.)*

Collection efficiency of parallel fiber layer filters was examined by changing fiber types, the length of fibers, the rate of fiber filling, and filtering flow speed. The mechanism of dust collection was studied by calculating the inertia interference at the both ends of fibers and by calculating the inner layer dispersion interference. Equations are presented. In parallel fiber layer filters, the length of fibers approximately forms a logarithm permeability. With the increase of flow speed, permeability tended to decrease.

15693 APTIC NO. 33397

Kiyoura, Raisaku and Haruo Kuronuma

STUDIES ON THE REMOVAL OF SULFUR OXIDES FROM FLUE GASES AS A MEASURE TO PREVENT AIR POLLUTION (KIYOURA-T.I.T. PROCESS). *(Ryuan nado o fukusei suru endo haigasu no jogaiho ni kansuru kenkyu (Kiyoura-T.I.T. ho). Text in Japanese. Koatsu Gasu (High Pressure Gas, Eng.), 8(2):65-71, April 1971. 9 refs.*

The flow-sheet of the T.I.T.-Kiyoura method of the dry flue desulfurization method is presented, and the principles of the processing and operation are discussed. Results of operation tests of a pilot plant using this method are reported. The process consists of oxidation of sulfur dioxide using a vanadium catalyst and creation of ammonium sulfate ((NH4)2SO4) with sulfuric anhydride, water, and ammonia in their gas phases. The (NH4)2SO4 in powder form is collected by a Cottrell dust collector. According to the tests given by a pilot plant of a 500 N cu m/hr capacity, at the reaction temperature of 420-450 C and SV 3000, SO2 transformation ratio was 90-93%, Cottrell collection rate was 97.5%, and the purity of the collected (NH4)2SO4 was 99.17 99.5%. The presence of ashes scarcely influenced the activity of the catalyst, and with the converter operation temperature lower than 450 C, carbon monoxide also had almost no influence. Studies were also made on thermal analysis of (NH4)2SO4 in order to determine the optimum condition of the ammoniator.

15694 APTIC NO. 34145

Koehle, H.

BASIC INFORMATION ON DRY CENTRIFUGAL COLLECTORS. *Can. Mining J., 91(10):85-88, Oct. 1970.*

A dry centrifugal collector generally includes one or more cylindrical units into which dust-laden air enters so as to cause a spinning action. This spinning action produces a centrifugal force, and since the dust weighs approximately 1000 times as much as the gas, the dust travels radially through the gas to the walls of the cylinders. Concentric with the cylinders, an outlet tube or pipe is provided to remove the cleaned spinning gas from the center of the cylinder and discharge it through one end. A number of types of dry centrifugal collector are available for various applications, efficiencies, pressure drops, or gas volumes. Inlet conditions of the gas and characteristics of the dust affect the performance and sometimes the costs of dry centrifugal collectors. These factors are also affected by the design, including relative proportions and many special features. Advantages and limitations are discussed.

15695 APTIC NO. 33478

Koepernik, Karl Hermann

METHOD OF TREATING EXHAUST GASES. *(Kali-Chemie A. G., Hannover (West Germany)) U. S. Pat. 3,310,366. 6p., March 21, 1967. 8 refs. (Appl. Dec. 18, 1961, 3 claims).*

A method is described for producing catalysts and alumina carriers which are especially useful for oxidizing exhaust gases from internal combustion engines. An alumina carrier with excellent strength properties, heat stability, and a prolonged service life is produced by adding ammonia to an aluminum salt solution, then filtering off and washing the precipitated aluminum hydroxide gel. The gel is dried, ground to a particle size below 100 micron, and treated with dilute acetic acid to produce a paste of a consistency sufficient to permit extrusion. The peptized aluminum hydroxide is shaped and the pellets dried and calcined at a temperature between 900 and 1300 C. The resulting alumina catalyst carrier bodies are then impregnated with a solution of metal compounds such as platinum and palladium compounds or silver compounds. A copper oxide-chromium oxide combination also gives good results.

15696 APTIC NO. 33608

Kono, Hiroshi

URBAN REFUSE INCINERATOR. *Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 38(10):945-954, Oct. 1971.*

Although urban refuse contains many kinds of wastes, combustion temperatures are generally maintained at about 750-950 C. However, it is most important to select a grate that will be satisfactory for a particular purpose. The Felunt furnace consists of a drying grate, two burning grates, a burning-out grate, and a rotary kiln for the difficult-to-burn objects. Combustion heat is recovered by a boiler, and the dust is completely collected by an electrostatic precipitator. Since plastics are increasing in refuse, further control measures are now under consideration.

15697 APTIC NO. 33375

Koyama, Yoshimasa

INDUSTRIAL ODOR NEUTRALIZATION DEVICE. *(Sangyoyo akushu chuwa dasshu sochi ni tsuite). Text in Japanese. Nenryo Oyobi Nensyo (Fuel and Combustion), 38(10):48-58, Oct. 1971. 9 refs.*

The airwick aerosol deodorization system consists of a spray gun, an air compressor, and an airwick forcing tank, with a compression capacity of 1 kg/sq cm and aerosol pressure of 3-5 kg/sq cm. Generally, 2-40 g/min of airwick solution is used with 60-80 l of air. The forcing tank is constantly kept at 0.5 g/sq cm by aand an an attenuator. The OMK deodorization system was developed in order to improve the contact effectiveness of the aerosol method. Exhaust gas is treated by a spray gun and comes into contact with a neutralizer which is smeared on the filter between the spray tank and the dispersion tank. The air is then sent to a rotating feather tank where it is dispersed and treated by splashes of neutralizer. The bubles created in this tank are sent to a shower tank, and the gas is emitted. A sanitary station where the OMK system is installed has an underground storage tank of 2,000 kl capacity, where 800-1,000 vacuum cars daily bring in sewage. The sewage is sent from the tank through a cutter and pump rooms to barges on the river in the back of the plant. Three consecutive OMK systems are used to neutralize bad odor which is collected from 15 suction locations and sent to the system by turbofans. By this system, 10 50 ppm ammonia concentration cannot be detected after going through the deodorization system. Hydrogen sulfide of 20 60 ppm concentration is reduced to 5 - 15 ppm, and the olfactory test proves a reduction of intensity by 5 to 1.

15698 APTIC NO. 33380

Koyama, Yoshimasa

NEUTRALIZATION OF ODOR BY DEODORANT. *(Shoshuzai ni yoru shuki no chuwa). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 9(3):21-27, Aug. 1971. 8 refs.*

Various methods of deodorization are reviewed, including the difference between deodorization and elimination of odor producing material, neutralization of odor, and the masking method. Omi Brothers Co., Ltd. obtained the sales rights of airwick in Japan in 1952. Airwick is a neutralizer developed by Guy Pascal of Airkem in 1940, and is now used widely in Japanese homes and by commercial and industrial establishments. Several apparatus using airwick are introduced. The Aerosol deodorization apparatus used used at sewage treatment plants consists of an air compresser, a neutralizer forcing tank, and a spray gun. Another apparatus used at sewage treatment plants is the odor suction aerosol deodorizer, which consists of a scrubbing tank, a neutralizer aerosol tank, and a blower. The odor-containing air is sucked into the system and washed in the scrubbing tank where water-soluble material dissolves; the air comes into contact with the neutralizer in the aerosol tank, then is emitted into the atmosphere by the blower. Various types of airwick are recommended for various specific purposes and types of odor producing plants and facilities.

15699 APTIC NO. 33563

Kurkin, V. P.

SPECIAL ASPECTS OF THE REGENERATION OF GLASS FILTER FABRICS. *(Einige Besonderheiten bei der Regenerierung von Glasfiltergeweben). Text in German. Luft Kaeltetech., 5(4):182-184, Aug. 1969.*

The forces coming into play during the regeneration of glass fiber fabrics include the force of gravity of the detached dust, the force induced by vibration of the fabric during regeneration, the tangential component of the adhesive force of dust, and the normal component of the adhesive force of dust. These forces and the force of the incident flow are calculated and the effect of dust adhesion on regeneration intensity analyzed. The equations derived were tested on different glass fiber fabrics. Results indicated that the intensity of regeneration of a glass fabric saturated with dust depends on the adhesion of the dust and that the glass fabrics most permeable to air possess the best regeneration characteristics. Thus, the possibility of regeneration is governed not by the nature of the dust but by the pressure loss gradient.

15700 APTIC NO. 33773

Kuronum, Haru, Kohei Urano, and Raisaku Kiyoura

ADSORPTION OF SULFUR DIOXIDE BY ACTIVATED CARBON. *(Kasseitan ni yoru aryusan gasu no sanka kyuchaku sokudo). Text in Japanese. Kogyo Kagaku Zasshi (J. Chem. Soc. Japan), 74(10):1971-1975, 1971. 7 refs.*

As a basic study of activated carbon adsorption of sulfur dioxide, the speed of adsorption reaction of gases with similar composition as stack gas was measured by a thermobalance. The experiments were conducted under a condition free of dispersion influences, and where the surface reaction velocity could be regular. Adsorption rate was great in the beginning and decreased with the passing of time, or with the increased of adsorbed material. After some 20 hours, a state of quasi-equilibrium was reached. Oxidation adsorption of SO2 was definitely impaired by accumulation of sulfur acid on active carbon; however, another reaction was in progress at a slight rate regardless of the amount of sulfur acid accumulation. The speed of adsorption had no relationship with the amounts of nitrogen and carbon monoxide, but had a definite relationship with the concentration of SO2, oxygen, and vapor. The adsorption reaction rate was formulated, and the mechanism of adsorption was explained by conjecture. The concentration of sulfuric acid adsorbed by active carbon was measured and was compared with the concentration of sulfur acid solution formed at the time of adsorption by vapor partial pressure and temperature; they were approximately the same.

15701 APTIC NO. 34028

Kuronuma, Haruo, Kohei Urano, and Raisaku Kiyoura

OXIDATION ADSORPTION OF SULFUR DIOXIDE IN PACKED BED OF ACTIVATED CARBON. *(Kasseitan jutenso ni yoru aryusan gasu no sanka kyuchaku). Text in Japanese. Kogyo Kagaku Zasshi (J. Chem. Soc. Japan), 74(10):1976-1981, 1971. 7 refs.*

A desulfurization apparatus to remove sulfur dioxide from exhaust gases by adsorption as sulfuric acid on activated carbon is discussed. The method of obtaining the breakthrough curve with calculations is developed, and its application to the design of desulfurization equipment is evaluated. The balancing of substances in a packed bed and the outlet concentration versus time curve during adsorption in a packed bed of activated carbon are calculated based on adsorption rate equations. The calculated results are compared with laboratory experiments. The calculated outlet concentration versus time curve was in good agreement. Thus, the outlet concentration versus time curves for adsorption in a packed bed (at various gas concentrations, flow rates, amounts of activated carbon, and size of bed) can be calculated from the rate of adsorption and adsorption isotherm of the particular activated carbons obtained using a thermobalance-type adsorption apparatus.

15702 APTIC NO. 33706

Kuwata, T., Y. Oguchi, and H. Nomura

HYDROGENATION DESULFURIZATION METHOD OF PETROLEUM HYDROCARBONS CONTAINING DISTILLATION RESIDUE OIL. *(Joryu zanyu o fukumu sekiyukei tanka suiso no suisoka datsuryu-ho). Text in Japanese. (Japan Petroleum Co., Ltd., Tokyo) Japan. Pat. Sho 46-19707. 6p., June 2, 1971. (Appl. July 29, 1967, 1 claim).*

A new method of hydrodesulfurization of petroleum is presented. A water colloid solution of basic sulfuric acid aluminum is mixed with silicasol and is passed through a waterless catalyst at 40 100 C, forming silica-alumina spheric hydrogel. After washing in water, sulfuric acid root is eliminated by alkaline water solution, and the material is dried at less than 750 C. This silica-alumina carrier containing 5-15% by weight silicon dioxide is digested in water solution of a hydrodesulfurized activated metal compound, dried, and baked at over 350 C. The resulting material is used as a catalyst in catalytic hydrodesulfurization of petroleum hydrocarbons containing distillation residual oil.

15703 APTIC NO. 33791

LaFarge, Arnold X.

PUMPING HEAVY SLUDGE HELPS SOLVE AN AIR POLLUTION PROBLEM. *Water Sewage Works, 118(10):335-337, Oct. 1971.*

At a sewage-treatment plant in Chicago, the flash drying of 450 tons of sewage solids per day resulted in the emission of odorous gray-white grease aerosols. Air pollution is now controlled by mixing the sludge with filter cake to obtain a sludge with a five to six percent solids concentration and pumping the sludge (with centrifugal pumps) to digesters and a Zimmerman process plant for treatment. Here the sludge is oxidized with wet air to an inert, ash-like material suitable for land or earth fill. The treatment capability of the Zimmerman plant was doubled (to 300 tons per day) without the need to enlarge facilities by increasing the solids content of the sludge to five or six percent.

15704 APTIC NO. 34027

Land, G. W.

TRIALS OF ADDITIVES FOR SULFUR-DIOXIDE REMOVAL IN INDUSTRIAL PLANTS. *J. Eng. Power, 92(1):36-38, Jan. 1970. 5 refs. (Presented at the American Society of Mechanical Engineers and the Institute of Electrical and Electronics Engineers, Power Conference, Charlotte, N. C., Sept. 21-25, 1969, ASME Paper 69-Pwr-3.)*

Trials of additives for control of sulfur oxides emissions made by a group are reported in some detail. Trials involved limestone, dolomite an aluminum industry waste material (red mud), and a natural-occurring sodium bicarbonate mineral, nahcolite. Combustion equipment used in the tests include a multiple-retort underfeed stoker, a traveling-grate spreader-stoker, a chain-grate stoker, a pulverizer, and an oil burner. Results obtained with the limestone and dolomite ranged up to the high 30 s for percentage removal, using up to twice stoichiometric amounts of stone. With red mud, reductions of up to 39% seem attainable with the use of less additive in lb-ton of fuel than with most of the calcium minerals. The sodium minerals gave the greatest reduction -- up to 73% removal when stoichiometric amounts were added. (Author summary modified)

15705 APTIC NO. 34081

Lee, G. W. and J. P. Graham

MITIGATION OF SMOKE, DUST, AND GRIT AT COKE-OVEN PLANTS. *Iron Steel Inst., London, Spec. Rept., no. 61:51-55, 1958. 10 refs. (Presented at the Iron and Steel Institute, Air Pollution Meeting, London, England, Sept. 25-26, 1957.)*

Coke oven plants and the present scale of carbonization are examined with respect to primary sources of smoke, grit, and dust emissions, preventive actions, and future developments. Pollutant emissions occur during charging, carbonization, and discharging, quenching, and handling of coke. Improvements in the processes to mitigate emissions include efficient door handling to obviate unnecessary exposure to heat, careful attention to the design of the coke guide, oven tops, and coal charging hoppers, the use of a double take-off, portal-type changing cars, improved design of charge-hole cover, mechanical cleaning of self-sealing doors and oven tops, dry quenching, and the total enclosure of coke screens.

15706 APTIC NO. 33843

Leunig, G.

REDUCTION OF THE EXHAUST GAS EMISSION BY FUEL LAYERING. *(Verringerung der Schadstoff-Emission durch Ladungsschichtung). Text in German. Automobiltech. Z. (Stuttgart), 73(10):394-395, Oct. 1971. 1 ref.*

A combustion process is described which produces lower emissions. Fresh air is forced into a circular movement by an obstacle arranged unilaterally at the inlet valve. The turbulent compressed flow is obtained by compressing the air between the piston-head and the cylinder-head; the fuel is injected into the flow at the beginning of the compaction stroke. The injected fuel assembles around the spark gap in cloud-like manner. A certain minimum octane number is required, which can be very low. The fuel is completely burned. Only a small amount of fuel reaches the cylinder walls. The relatively lean mixture which is produced causes a lower emission of carbon monoxide and of the oxides of nitrogen. The emission of the oxides of nitrogen can further be reduced by exhaust gas recirculation.

15707 APTIC NO. 34274

Leunig, G.

EXHAUST GAS DECONTAMINATION THROUGH CONSTRUCTIVE MEASURES ON CARBURETOR AND IGNITION SYSTEM. *(Abgasentgiftung durch konstruktive Massnahmen an Vergaser und Zuendanlage). Text in German. Motortech. Z. (Stuttgart), 32(10):388-389, Oct. 1, 1971. 1 ref.*

A prerequisite for achieving low carbon monoxide emissions with the Otto engine is combustion with surplus air. In experiments with a four cylinder, four stroke engine, the total fuel-to-air ratio lambda, as well as the lambda of individual cylinders, was determined. Results for 13 and 30-degree throttle-valve openings are graphically illustrated. At a lambda between 1.0 and 1.1, two cylinders operated with considerable lack of air. Depending on the position of the throttle valve, cylinders three and four or cylinders one and two received too rich a mixture. For better results, the injection pipe was shifted from a 45-degree entrance angle to a perpendicular angle with respect to the throttle-valve axis. The injection pipe was left open at the bottom. A relatively good mixture distribution was obtained with these measures. To reduce high carbon monoxide emission when wheels push the engine, the underpressure in the idling tube was lowered through ventilation.

15708 APTIC NO. 33529

Lindberg, R. D.

POLLUTION CONTROL AT IMC S POTASH OPERATIONS IN SASKATCHEWAN, CANADA. *Preprint, American Inst. of Mining, Metallurgical and Petroleum Engineers (AIME), New York, N. Y. 15p., 1968. (Presented at the American Institute of Mining, Metallurgical, and Petroleum Engineers, Annual Meeting, New York, Feb. 25-29, 1968.)*

Methods employed at two Potash mine-refinery complexes for control of air, water, and soil pollution are described. At one refinery, the capital cost of equipment and dykes to control possible pollution was 3% of the total capital investment. One source of air pollution is the mechanical production of dust by the material handling equipment. Each hoist, belt conveyor transfer point, or vibrating screen causes degradation and the production of some fine dust. The escape of this dust is prevented by extensive use of small self-contained scrubbers and by large continuous bag filters for the concentrated dust production areas such as the screening plant. The most serious source of air pollution could be the discharge from the gas-fired potash dryers. A three-stage dust collecting and scrubbing system was installed to remove the dust and brine. The three stages are dry cycloning, wet scrubbing in a cyclonic tower, and wet scrubbing in a Doyle scrubber. The first stage of dryer dust collection consists of high efficiency, high pressure-drop nested cyclones. The dust is reclaimed and returned to the process. Each of the scrubbing circuits has an induced draft fan rated at 50,000 cfm against 20 in. of water suction and driven by a 450-HP motor. The fans are placed between the scrubber and stack. The gases are finally released to the atmosphere through a 300-ft stack. The total loss of potash in 450 lbs/day.

15709 APTIC NO. 33879

Lindeken, C. L. and O. L. Meadors

THE CONTROL OF BERYLLIUM HAZARDS. *Am. Ind. Hyg. Assoc. J., 21(3):245-251, June 1960. 14 refs.*

Two types of respiratory damage, acute pneumonitis and chronic pulmonary granulomatosis, occur in the beryllium industry in workers exposed to beryllium dusts, fumes, and mists. Acute beryllium pneumonitis causes inflammation of the upper respiratory tract. Chronic pulmonary ranulomatosis is usually a delayed disease, appearing from three months to six years after exposure, and may be fatal. As a result of several fatalities, maximum allowable concentrations for beryllium have been determined. The in-plant concentration should not exceed 2 micrograms/cu m as an average throughout an 8-hr day. The only effective method for preventing the spread of beryllium dust is to contain and remove it at its source. In the enclosure technique, the worker and environment are protected by maintaining the zone of dust generation at a negative pressure with respect to the work area. This is accomplished by exhaust ventilation. Dust collection by high efficiency filtration is very important in the enclosure approach. Filters protect the manifolding from being contaminated and remove hazardous dust from effluent air exhaust. A continuous air monitoring program is required to evaluate the performance of enclosures, and to assure that beryllium dusts are not released to the room atmosphere.

15710 APTIC NO. 33794

Litchfield, D. K.

CONTROLLING ODORS AND VAPORS FROM API SEPARATORS. *Oil Gas J., 69(44):60-62, Nov. 1, 1971. (Presented at the National Petroleum Refiners Association Western Regional Meeting, Casper, Wyo., 1971.)*

A small hot-water bath simulating a refinery API-separator was built to study the effects of ambient air, influent temperature, and light-ends evaporation losses on separator hydrocarbon evaporation losses. Influent temperature (average 140 F) had the greatest effect on total losses. For each 10 F increase in temperature, there was a corresponding 2.2% increase in losses. For each 10 F increase in ambient temperature (average 40 F), losses increased 0.3%. A 20 F decrease in the 10% point of influent oil (average 300 F) increased losses by 0.6%. The losses have been reduced approximately 85% by floating Foamglas slabs on the oil surface. The cover was installed at a cost of $.50-$.60/sq ft.

15711 APTIC NO. 33790

Lloyd, William G. and Donald R. Rowe

HOMOGENEOUS CATALYTIC OXIDATION OF CARBON MONOXIDE. *Environ. Sci. Technol., 5(11):1133-1134, Nov. 1971. 11 refs.*

Carbon monoxide in gas mixtures can be rapidly and efficiently oxidized at ambient temperatures to carbon dioxide. An old analytical technique for the assay of carbon monoxide has been adapted to provide a fast catalytic process based on palladium (II)/copper(II). Passage of a test mixture containing 2000 ppm CO through an aqueous solution at ambient temperature in a simple laboratory apparatus affords 97% conversion to CO2. (Author abstract)

15712 APTIC NO. 34069

Lovering, Earle W.

BRASS CHIP DRYING AT SCOVILL ELIMINATES SMOKE NUISANCE. *Wire J., 4(10:51-53, Oct. 1971.*

Zinc oxide, oil smoke, and vapors are generated by the melting and casting of brass. The zinc oxide arises from the zinc constituting 30-40% of most yellow brasses, while the black oily smoke comes from the two to seven percent cutting oil remaining on machining chips used in the melting charge of lead brasses. Most states no longer permit the discharge of these emissions to the open air. Big filters effectively remove the zinc oxide particles from exhaust fumes. The black oil smoke is controlled by drying the chips in a rotating dryer drum with a gas burner at the entrance. As the chips tumble during transit through the dryer, the oil vaporizes and burns, forming a reducing atmosphere which prevents excessive oxidation. Combustion gases burn at 1500 F in an afterburner, with an excess of air that forms carbon dioxide and water vapor. These nonpolluting gases are exhausted through the main stack. This chip-drying system enables a Connecticut plant to comply with the clean air requirements of the state.

15713 APTIC NO. 33449

MacKnight, Robert J., Herbert Simon, and Andrew J. Wilson

CONTROL OF DUST EMISSIONS FROM SHIP LOADING. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 22p., 1970. (Presented at the Air Pollution Control Association, Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970.)*

A discussion is presented of the experience of the Los Angeles County Air Pollution Control District with air-pollution problems associated with the bulk loading of commodities into ships. Air induced into the ship s hold by the fall of the material through the loading chute constitutes the major problem in bulk loading. All Los Angeles County installations employ baghouses but vary their solution to the enclosure of the hatch being loaded; some use tarpaulin, some cargo parachutes, and other non-reinforced plastic sheeting. The most effective conttrol system is based on a movable loading gantry with an extendable boom from which a telescoping loading spout drops into the ship s hold. Two baghouses are mounted on the gantry and exhaust the hold through a flexible duct suspended from a knee action main duct. A metal/nylon enclosure is used for the loading spout and a glass fiber reinforced covering for the hatch. All the techniques discussed are applicable to a wide range of bulk commodities, including calcined petroleum coke, wheat, milo, alfalfa pellets, borax potash, iron ore, and pelletized iron ore. (Author abstract modified)

15714 APTIC NO. 33763

Makino, K., T. Imamura, H. Okura, and K. Iidani

PERFORMANCE OF FIBROUS DUST LAYER FILTER. *(Sen ijo funjin-so firuta no hoshu seino ni tsuite). Text in Japanese. Preprint, the Japan Society of Chemical Engineers, Tokyo, p. 21-22, 1971. (Presented at the Japan Society of Chemical Engineers, Autumn Conference, 5th, Osaka, Japan, Oct. 1971.)*

Efficiency of fibrous dust layer filters was examined by various types of fibrous dust fillings in a given size cylinder, and by comparing the collection rate with that of ordinary fiber filters. With the increase of the volume of the filling, efficiency of filtering decreased, but the volume of collection reached several times that of fiber filters. The rate of fibrous dust layer filter was calculated and expressed in equations. The fibrous dust used in these experiments were various types from 15 to 22 micron diameters and 80 to 220 micron lengths.

15715 APTIC NO. 33565

Maksimov, V. F., A. I. Torf, S. P. Pasechnik, P. A. Lupanov, and A. D. Vodnev

PURIFICATION OF FLUE GASES FROM PARTICLES OF SODIUM SALTS DUST IN A SHCHEKIN CHEMICAL PLANT. *(Ochistka dymovykh gazov ot pylevykh chastits soley natriya na Shchekinskom khimicheskom kombinate). Text in Russian. Khim. Prom. (Moscow), no. 12:914-916, 1970.*

Construction of a jet apparatus is described for purification of flue gases of sodium salt dust after combustion of sodium adipate. The flue gases of 1000-1100 deg temperature are advanced from cyclone furnace into a hollow scrubber and sprinkled with water, which represents first stage of purification.

Here the gases are cooled to 75-80 deg and partially ridden of dust. Jet apparatus represents second purification stage. Water is pumped into jet apparatus under the pressure of seven to eight bar to ensure large surface of contact between sprinkling water and flue gases. Another hollow scrubber follows, which is not sprinkled with water, where water droplets separate from the gas flow. Purified gas is released into the atmosphere. The calculation of jet apparatus efficiency in the dedusting of flue gases showed that 90% purification from sodium salts dust is achieved. The operating costs are low.

15716 APTIC NO. 34019

Mallozzi, F.

WET COLLECTORS CONTROL DUST AND AIR POLLUTION. *Can. Mining Met. Bull. (Montreal), 64(714):77-84, Oct. 1971. (Presented at the Canadian Institute of Mining and Metallurgy, Annual General Meeting, 73rd, Quebec City, Quebec, April 1971.)*

The ventilation engineer plays an important role in providing the expertise for the design and installation of systems which will provide effective in-plant dust control and which will also prevent atmospheric pollution. He has at his disposal many types of dust collectors, and these are usually classified in the following categories: dry centrifugal collectors, wet collectors, cloth collectors, and electrostatic precipitators. The range of particle size and dust concentrations is shown for a number of industrial processes, as well as the effective range of the various types of collectors. There are six principal forces which cause collection or precipitation--gravitational force, centrifugal force, inertial impaction, direct interception, diffusion, and electrostatic forces. Factors which influence collection include dust concentrations, specific gravity, shape factor, temperature, and agglomeration. Low-pressure-drop, medium-pressure-drop, and high-pressure-drop collectors are described. Collection efficiency, water requirements, materials of construction, dust disposal methods, and maintenance requirements are discussed.

15717 APTIC NO. 33971

Mashita, Takashi

WET-TYPE DUST COLLECTOR UTILIZING CONDENSATION. *(Gyoshuku o riyo shita shisshiki shujinki soriboru). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 7(10):573-574, Oct. 1971.*

A new, wet-type dust collector consists of a casing, and many venturi pipes arranged in parallel in the casing, and water jet nozzles at the both ends of the pipe bundle. Dust-containing gas flows into the casing and into the narrow part of the venturi pipes where the speed and pressure drop. Vapor condensation occurs and dust particles are covered by a thin liquid film. The turbulent air current created at the narrow throat and the difference in sizes and weight of the particles cause collision of dust particles and water drops, enlargine each particle. As they leave the venturi pipes, they are sprayed by the water jet and large dust particles drop down as sludge. Clean gas goes through a vapor separation apparatus and is discharged. This apparatus is particularly effective for collection of large quantities of small particles (down to 0.04 micron). The contact of the gas and jet liquid is great and uniform, and toxic gases such as sulfur dioxide and fluoride can be absorbed easily. The decrease in flow speed or quantity has no effect on the collection efficiency. The circulation of the jet water is easy, and the maintenance of the spray nozzle is easy because of the large opening. Wearing from friction is limited because of the slow speed of the gas.

15718 APTIC NO. 33677

Matsuda, Keiichiro

ELIMINATOR FOR AIR SCRUBBER. *(Kuki senjoki no erimineta). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 46-27729. 3p., Sept. 23, 1971. (Appl. Feb. 12, 1968, 1 claim).*

A method of manufacturing an accordion pleat eliminator at a lower cost was devised by connecting strips of hard or semi-hard synthetic resin. One end of the strip has a cylinder or T-shaped thimble joint, and the other end has a coupling socket into which the thimble joint will be inserted. Connecting a proper number of strips in the like-manner, one can obtain a required size accordion pleat eliminator for a condenser or an air scrubber.

15719 APTIC NO. 33695

Matsuyama, Takuzo, Ko Aoki, and Norio Toraya

CHEMICAL ENGINEERING STUDIES OF ELECTRIC DUST COLLECTORS (REPORT NO. 2). *(Denki shujinki no kagaku kogaku-teki kenkyu). Text in Japanese. Preprint, the Japan Society of Chemical Engineers, Tokyo, p. 13-14, 1971. 1 ref. (Presented at the Japan Society of Chemical Engineers, Autumn Conference, 5th, Osaka, Japan, Oct. 1971.)*

Time variations of one-step and two-step electric dust collectors were examined by observation of the dust accumulation rates. Collection rates were measured by a 0.1 g balance and the relationship between time and accumulation was observed. The surface area of the collectors was 200 sq cm the impression voltage ran 7.8 to 15 KV, and the dust concentration was 0.5 30 g/cu m. Test dusts were 0.03 micron particulates of calcium carbonate. Both one-step and two-step collectors stopped collecting dust after a certain period of time. Levelling-off was reached when the volume of dust reached (in g/cu m) 3.3 times 10 to the minus sixth power V(1.4) e(0.4s) t(1.0) for the one-step collector, and 7.3 times 10 to the minus seventh power V(1.5) e(p.3s) t(1.0) for the two-step collector. Where s was dust concentration (g/cu m) and t was time (min). Jet air cleaning of the dust was 70% effective.

15720 APTIC NO. 33591

Matveenko, Y. V.

HYDRODYNAMIC CLEANING OF GASES. *(Gidrodinamicheskaya ochistka gazov). Text in Russian. Liteinoe Proizv., no. 6:16-17, 1971.*

The steel casting shop of a metallurgical plant in Moscow uses 3 kinds of dust collectors. One of these is intended for the decontamination of the dusty air occurring within the aspriation facility of the stamping grills. The dust collector elicits optimal functional conditions when an 18,000-22,000 cu m/hr air expenditure at its inlet is used, whereby a decontamination to 0.003 g/cu m of dust is obtained. Another dust collector is used in the aspiration facility for the removal of water vapor and of fine dispersed particles occurring in the process of sand or soil drying. In this case poorer results are obtained because of the accumulation of fine dispersed foam. The third dust collector was designed especially for the decontamination of waste gases produced by the arc furnace used for the melting of rustproof and fireproof steels. In this case condensing aerosols and fine granulated admixtures constitute the main dust sources. The collector allows to obtain an average of 70% of dust decontamination. Characteristics and an illustration of the dust collector are given.

15721 APTIC NO. 33554

McCann, C. R., J. J. Demeter, A. A. Orning, and D. Bienstock

NOX EMISSIONS AT LOW EXCESS-AIR LEVELS IN PULVERIZED-COAL COMBUSTION. *Preprint, American Society of Mechanical Engineers, New York, Air Pollution Controls Div., 8p., 1970. 21 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, New York, Nov. 29-Dec. 3, 1970, Paper 70-WA/APC-3.)*

Emissions of air pollutants are reported in the combustion of 500 lb/hr of pulverized coal at various excess air levels in a dry-bottom furnace with water-cooled walls. Nitrogen oxides decreased 70% (from 575 ppm to 175 ppm) as excess air was lowered from 25 to 1.4%. Retention of coal sulfur by the ash was 2.4%, the balance appearing as sulfur oxides in the furnace gas. Sulfur dioxide ranged from 1415 at 21.4% excess air to 1785 ppm at 3.8%. Sulfur trioxide values were one to seven ppm. Retention of coal chlorine by the ash was 4.6%, the balance appearing as 8.0 to 14 ppm hydrogen chloride in the combustion gas. Retention of coal fluorine by the ash was 11.2%, the balance emitted as 8.0 to 14 ppm hydrogen fluoride in the gas. At lower excess air levels, carbon combustion efficiencies could be maintained at 99% by increasing the air preheat from 600-650 F to 700 F and maintaining a stable air-fuel ratio. (Author conclusions modified)

15722 APTIC NO. 33590

McIlvaine, R. W.

AIR POLLUTION CONTROL INVOLVES INDUSTRIAL HYGIENE. *Foundry, 99(10):74-77, Oct. 1971.*

The ideal solution to air pollution problems requires the proper relationship between industrial hygiene and air pollution control, with more mistakes and ill-spent money resulting from this lack of integration than from probably any other cause. An experience is described concerning the design of a ventilation and dust collection system for a new foundry. During the project, the foundry decided to consider use of an excess of prepared sand which would mean that the return shakeout sand system would contain a relatively large percentage of moisture and a reduced quantity of dust. What reduction in air volumes and dust collection equipment could be achieved, and further, what reduction in total cost of the ventilation system could be made? Hood efficiency, dust generation, local exhaust, dilution ventilation, emissions to the atmosphere, and effective temperatures had to be considered in order to achieve an integrated solution to the problem. Cupola dust control was also considered.

15723 APTIC NO. 34024

cKinney, J. D. and John Stipanovich

LOW SULFUR FUEL OIL PRODUCTS - GULF HYDRODESULFURIZATION PROCESS. *American Petroleum Inst., New York, Div. of Refining, Proc. Am. Petrol. Inst. Div. Refining, vol. 51:692-712, 1971. 5 refs. (Presented at the Midyear Meeting, 36th, San Francisco, Calif., May 12-14, 1971.)*

Residual oil hydrodesulfurization is made difficult because of catalyst deactivation from metal deposits. A proprietary catalyst was developed by Gulf that permits fixed-bed catalytic hydrodesulfurization of residuals for suitably long process cycles. Hydrogen partial pressure rather than total reactor pressure controls catalyst activity. The process is described, as well as design philosophy. The Gulf HDS process for residual charges was demonstrated by pilot plant runs of six months and one year s duration while processing four percent sulfur Kuwait oil to one percent sulfur fuel. The first commercial HDS unit also charging Kuwait residual oil has been operating since January 1970 in Japan in Nippon Mining Company s Mizushima Refinery. The unit is designed for six-month cycles before catalyst change-out and is well into its second cycle of operation producing one percent sulfur fuel oil. Costs are cited. (Author abstract modified)

15724 APTIC NO. 33385

Meguerian, G. H. and C. R. Lang

NOX REDUCTION CATALYSTS FOR VEHICLE EMISSION CONTROL. *Proc. Am. Petrol. Inst., Div. Refining, vol. 51:186-206, 1971. 13 refs. (Presented at the American Petroleum Institute, Division of Refining, Midyear Meeting, 36th, San Francisco, Calif., May 12-14, 1971.)*

An investigation was undertaken to develop and evaluate a catalyst system for oxides of nitrogen control which would achieve target reduction levels established for the Inter-Industry Emission Control Program, with concurrent control of the hydrocarbons and carbon monoxide. Potential NOx catalysts were screened in the laboratory for chemical activity and stability and for hydrothermal stability in a specially devised laboratory NOx pulse-flame generator. The promising catalysts were then subjected to 50-100 hours of testing in the exhaust system of an engine running under steady-state conditions. Catalysts that maintained 80% effectiveness under steady-state conditions for about 50 hours were tested in actual vehicle systems. Precious metal catalysts, copper-based catalysts, iron oxide-based catalysts, and metallic alloy catalysts were tested. Investigations were conducted to determine the effect of ammonia production on the NOx catalysts. Vehicle calibration and converter design for optimizing NOx catalyst performance are discussed.

15725 APTIC NO. 33403

Meisel, S. L.

EXHAUST EMISSIONS AND CONTROL. *J. Wash. Acad. Sci., 61(2):91-102, 1971. 32 refs.*

The effects of leaded and unleaded gasolines on hydrocarbon, carbon monoxide, particulates, and nitrogen oxide emissions from current and future cars and the costs of emission controls to industry and the consumer are examined. Removal of lead from gasolines does not affect CO and NOx emissions, but decreases hydrocarbon emissions and changes the nature of particulate emissions. The exclusive use of lead-free gasolines could engender exhaust valve recession. The use of thermal reactors and catalytic converters with low-lead (0.5 g/gal) or unleaded fuels would lower the hydrocarbon and CO levels to meet standards. Nitrogen oxides control could be accomplished through decomposition using a catalyst; reduction over a catalyst using hydrogen and CO present in the exhaust; and exhaust gas recirculation systems. Particulate control systems include coalescers, cyclone separators, precipitators, and filters. The systems are examined for efficiency and effect of lead.

15726 APTIC NO. 33582

Meisen, A., A. J. Bobkowicz, N. E. Cooke, and E. J. Farkas

THE SEPARATION OF MICRON-SIZE PARTICLES FROM AIR BY DIFFUSIOPHORESIS. *Can. J. Chem. Eng., 49(4):449-457, Aug. 1971. 26 refs.*

The continuous separation of micron-size particles from air by diffusiophoresis in a parallel plate collector was studied theoretically. Two models for the particle behavior were considered. Model I was based on the assumption that the particles adopt the local fluid velocity whereas the Schmitt-Waldmann equation was used to determine the diffusiophoretic velocity in Model II. The latter also included thermophoretic and gravitational effects. The two models yielded similar results when diffusiophoresis was predominant. The theoretical results were also used in the sizing of an experimental particle collector. The collector, which operated under laminar flow conditions, was capable of removing the particles effectively and its performance conformed with the theoretical work. (Author abstract)

15727 APTIC NO. 34064

Metzger, K. J., R. D. Christman, and J. F. Marmo

GULFINING - A FLEXIBLE DISTILLATE DESULFURIZATION PROCESS. *Proc. Am. Petrol. Inst., Div. Refining, vol. 51:72-88, 1971. (Presented at the American Petroleum Institute, Division of Refining, Midyear Meeting, 36th, San Francisco, Calif., May 12-14, 1971.)*

The Gulf Research and Development Company desulfurization process is capable of high level desulfurization of a wide variety of distillates. Feeds ranging from light virgin gas oils to heavy vacuum gas oils are improved in quality in commercial units, which number 28 in all. An improved catalyst has recently been developed which provides for increased capability and flexibility for the process. The principal variables affecting the process are temperature, hydrogen pressure, space velocity, and feed properties. In general, sulfur removal increases as temperature and hydrogen pressure are increased and as space velocity and feed mid-boiling point are reduced. Data are presented on these effects. A kinetic analysis of virgin distillate pilot plant data resulted in the development of a rate equation which is pseudo 1.7 order with respect to sulfur. Brief investment and operating costs are presented. (Author abstract modified)

15728 APTIC NO. 33479

Mitchell, R. N. and E. C. Hyatt

BERYLLIUM - HAZARD EVALUATION AND CONTROL COVERING A FIVE-YEAR STUDY. *Am. Ind. Hyg. Assoc. Quart., 18(3):207-213, Sept. 1957. 6 refs.*

Data on evaluation and control of hazards during beryllium metal machining are presented illustrating that it is feasible to install engineering control measures that permit continuous beryllium processing operations at recommended tolerances. Sampling methods included an electrostatic precipitator, a portable Gast pump, and Whatman No. 44 filter paper used at a sampling rate of 10 l/min. Industrial hygiene surveys were initiated in 1948. In 1949, an addition was built onto the main shop and in this addition only beryllium was to be machined. All machines were equipped with local exhaust hoods. The air concentration never exceeded 25 micrograms/cu m. In 1952, the exhaust system was enlarged to provide a larger quantity of air for each machine and to add an additional lathe and mill to the shop. None of the air samples exceeded 2 micrograms/cu m. The results of all air samples collected during the five year period 1952-1956 showed that of the 1852 samples, only 1% were above 2 micrograms/cu m and 50% were below 0.05 micrograms/cu m, the lower limit of detection for the volume of air sampled. During the early months of 1952, a cloth tube filter was installed outside the old beryllium machine shop. When the new shop was completed, the cloth tube filter was installed in a filter room above the macine shop. A dynamic separator was installed before the cloth tube filter. In addition to dust control at its source of generation, the machine shop was thoroughly washed down each week and surface swipe tests were made to keep the amount of loose beryllium dust below 25 micrograms/sq ft. Complete protective clothing and adequate shower facilities were also available.

15729 APTIC NO. 33969

Miura, Mitsugu

NEW IDEAS ON WET-TYPE DUST COLLECTORS. *(Shisshiki shujin-ho no shin aidea). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 7(10):609-612, Oct. 1971.*

Various types of dust collectors are reviewed and their efficiencies are examined. New scrubbers are introduced as new types of dust collectors with excellent dust collection rates. Compared to the 60% efficiency of less than one micron particles by other wet-type collectors, a venturi scrubber generally has a higher rate of 97-98%. However, a venturi scrubber suffers from frequent damage and high power cost due to the high wind velocity of 70 100 m/sec in the throat section. The new scrubbers utilize the high efficiency of a venturi scrubber and the high speed rotation flow. Their characteristics are: a high ratio of gas-liquid contact; extremely small liquid consumptions; limited space required for installation; easy maintenance; and low installation cost. These scrubbers, installed in various parts of Japan, have produced 94 to 98.7% dust collection rates.

15730 APTIC NO. 34044

Miyagi, Hiroshi

DUST COLLECTION OF PAPER PULP INDUSTRY. *(Kami parupu sangyo no shujin ni tsuite). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 7(10):575-580, Oct. 1971.*

In the paper pulp industry, both sulfite process and the Kraft Process create dust particulates, but the latter is particularly troublesome. Dusts are created by the dissolver emission pipe, the burned lime bin, and the caustic tank emission pipe, but the recovery boiler flue and the rotary kiln produce especially large quantitites of dusts. The main component of the flue gas from a plant with a 500 t/day production capacity is 8-15 g/N cu m, or 40 - 70 t/day of mirabilite (sodium sulfate). Most plants use electric precipitators behind the recovery boiler, and most precipitators collect 90-98% of dusts. However, when the dust collection rate is only 90%, the stack gas sometimes contains more than one g/N cu m of $NaSO_4$, exceeding the air standards of the Air Pollution Control Law. In such cases, installation of a second dust collector is necessary, but this is not feasible for most plants because of the space involved. Usually a wet scrubber is used, but the design of a high efficiency scrubber is extremely difficult, due to the small size of $NaSO_4$ particles. However, the weak alkaline liquid which circulates between the recovery boiler and the caustisation (?) plant in a KP mill can be utilized for the scrubbing of gas, which reduces the cost of fresh alkali. The rotary kiln produces 20-70 g/N cu m dusts. The main components are calcium carbonate ($CaCO_3$) and calcium oxide (CaO), and a plant with 500 t/day production creates approximately 24 t/day of $CaCO_3$ and CaO. About 97-98% of dusts must be collected in order to meet the minimum air standard. Scrubbing of the gas may be achieved by diluted chemicals, but industrial water is sufficient, and desulfurization is achieved at the same time by CaO. The sulfur dioxide content in the emission gas after the treatment is almost zero.

15731 APTIC NO. 33617

Miyahara, Kingo

COMBUSTION DEVICE FOR ODOROUS GAS. *Text in Japanese. (Assignee not given.) Japan. Pat. Sho 46-23829. 2p., Aug. 17, 1971. (Appl. Dec. 9, 1963, 1 claim).*

An odor control device is described which comprises a suction section, a duct section, and a mixing/combustin section. The built-in blower sucks in the odorous gases together with air, then mixes them with an auxiliary fuel gas, and noiselessly burns the mixture for the removal of the odor. The mixing/combustion section is a box-like case with a vane wheel installed at its entrance and a burning element at the exit.

15732 APTIC NO. 33833

Miyajima, M.

DUST CONTROL OF OUR COMPANY. *(Tosha ni okeru shujin taisaku ni tsuite). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 7(10):583-586, Oct. 1971.*

Improvements were made on an electronic precipitator resulting in an increase in the collection rate from 83 to 97%; the dust count at the exit improved from 13 to 6 mg/N cu m (counts at the entrance were 75 and 84 respectively). The changes made on the precipitator involved separating two collection systems utilizing the dust collection board, thus dividing the dust collection chamber into two sections. Dampers were attached at the entrances and exits of the two precipitators; additional motors were installed and dust collection pole shafts were divided. Rapping cycles of electric currents were automated. The time schedule of one precipitator section is two minutes for closing the entrance damper; 13 sec for closing the exit damper; 20 min of concentrated rapping with five minute cycles; 20 min of rest; 13 sec for opening the exit damper; and 2 min for entrance damper. Rapping is carried out when the gas flow is stopped, thus preventing the re-scattering of dust particles. These improvements solved the problems of extremely small particulates produced by heavy oil boilers with ammonia additives.

15733 *APTIC NO. 33409*

Morikawa, Yoshiaki

METHOD FOR MALODOR REMOVAL. (Sakana, dobutsuruiyo unpanki no akusyu shokyo houho). Text in Japanese. (Nippon Synthetic Chemical Industry Co., Ltd. (Japan)) Japan. Pat. Sho 46-30318. 2p., Sept. 3, 1971. 1 ref. (Appl. June 23, 1967, 1 claim).

A method is described for the removal of odors from freight cars, trucks, and other conveyances of fish and animals by the direct spraying of an aqueous solution of 1-50% glyoxal with the addition of a small quantity of surface-active agent or perfume. Washing the conveyance is desirable but not always necessary.

15734 APTIC NO. 33407

Moriyama, Aritsune

DUST BAG CLEANING DEVICE FOR DUST COLLECTORS. *(Shijin sochi ni okeru baggu harai otoshi kiko). Text in Japanese. (Sanko Air Apparatus Co., Ltd., Osaka (Japan)) Japan. Pat. Sho 46-25984. 2p., Sept. 7, 1971. (Appl. Nov. 18, 1968, claims not given).*

This invention consists of a dust receptacle in a dust collector, which is suspended by a spring wire. When a certain amount and weight of dust is accumulated, the receptacle will turn over and create springing reaction of the wire, which in turn will brush off the dust particulates settled inside wall of the bag.

15735 APTIC NO. 33656

Muehlberg, E.

EXHAUST GAS RECIRCULATION AT COMBUSTION ENGINES, PRIMARILY AT DIESEL ENGINES. II. *(Abgasrueckfuehrung bei Verbrennungskfraftmaschinen, insbesondere bei Dieselmotoren). Text in German. Motortech. Z. (Stuttgart), 32(9):327-336, Sept. 1971. 3 refs. Part I. Ibid., 32(5), May, 1971.)*

Dynamometer tests with a small 25-hp tractor diesel engine were carried out to determine if exhaust gas recirculation permitted the efficient use of aromatic super gasolines without increasing compression ratio. Comparative tests without exhaust gas recirculation clearly demonstrated the great efficiency of exhaust gas recirculation. With it, the normally compressed two-cylinder engine operated with BV-ARAL super gasoline at the nominal 2000 rpm/min down to small loads. Only slightly more fuel was consumed. At 75% load, about nine percent more fuel was needed; at 50% load, about 13% more; and at 25% load, about 17% more. Results would have been even better with a straight-run gasoline, especially with regard to emissions. Street tests of a 50-hp tractor diesel operating with ethyl alcohol confirmed that exhaust gas recirculation allows the use of such a fuel without great reduction in the efficiency obtainable with diesel fuel.

15736 APTIC NO. 33398

Murahara, Masao

DEODORIZATION OF POULTRY EXCRETA BY BACTERIA PROCESSING. *(Biseibutsu ni yoru keifun no dasshu-ho). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 46-30764. 4p., Sept. 7, 1971. 2 refs. (Appl. April 25, 1967, claims not given).*

A newly discovered bacillus MM-43, No. 552 can be separated from soil and cultivated in amino acid culture made from agricultural product waste. This bacillus has a characteristic of breeding and growing at a temperature of approximately 50 C and has a deodorizing ability. Amino acid dreg 250 g (water 70%, nitrogen 0.8%), 160 ml of water, 7.5g of slaked lime, and three ml of the bacilli are mixed and cultured for 42 hours. Fresh chicken feces, 500 g, is mixed in the culture. The odor will disappear as the mixture is stirred, and the excreta will stay odorless after it is dried.

15737 APTIC NO. 33977

Murphy, A. S.

DUST CONTROL AT THE PRIMARY CRUSHER/LOADOUT LEVEL. *Can. Mining J., 92(10):72-73, Oct. 1971.*

Dust control at the primary crusher/loadout stages of a mining operation processing crude taconite to high grade iron ore pellets was examined. The primary crushing plant operates on two main dust control systems. The orginal system ventilates the rock box and apron feeder dust enclosure; air is ducted to a single compartment baghouse operating at an air-cloth ratio of 6.4:1. The clean side is exhausted by a centrifugal fan and clean filtered air is emitted. A plenum installed behind the top of the crushing bowl brings the dust load under ththe pull influence of the fan. The design incorporates the push-pull principle: the mechanical pull is supplemented by the push of natural ventilation. Dust at rapid loadout is controlled by a ventilation duct; dust conditions are very dependent upon weather conditions.

15738 APTIC NO. 33966

Nagaoka, Masaharu

DUST CONTROL OF THERMAL POWER PLANTS. *(Karyoku hatsudensho no baijin taisaku ni tsuite). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 7(10):591-594, Oct. 1971.*

The thermal power plants of the Tokyo Electric Co. use coal (or a coal and heavy oil mixture), liquid nitrogen gas, or heavy oil for fuel. Those plants operated by coal use electrostatic precipitators with 97-99% collection efficiency. Some of the improvement measures for dust collection are: increase of electric load, increase of discharge and effect of dust collection, washing the precipitators with water, replacing electrodes, and improving the hammering actions of the collection boards. Dust collection in heavy oil furnaces has been improved to bring more than 80% collection results by adding ammonia to the heavy oil. Ammonia is poured so that the molecular ratio of ammonia and sulfuric acid in the dust is mory than one to three. Ordinarily, 0.04%-0.0% of the quantity of heavy oil is the amount of ammonia added. Acid smut and boiler metal corrosion are minimized by operating the boilers with the minimum air/fuel ratio with the amount of oxygen necessary for complete combustion. Approximately one percent of the oxygen supply is necessary for the stable operation of boilers. Othe improvement measures are: maintenance and thorough check on the conditions of burner tips, control and balance of the burner flow quantity, and control and balance of the air-fuel ratio.

15739 APTIC NO. 33734

Nakamura, Kiyohiko

PREVENTION OF ACID SMUT FROM SMALL SIZE OIL FIRING BOILER. *(Kogata juyu boira no entotsu kobai boshirei). Text in Japanese. Netsu Kanri (Heat Management: Energy and Pollution Control), 23(9):29-33, Sept. 1971.*

A small boiler (with a maximum steam quantity of 1750 kg/h and a combustion chamber of 2.8 cu m) produced a great quantity of acid smut. It was remodelled with the following improvements in mind: complete combustion of soot, low oxygen combustion in order to prevent sulfur dioxide and sulfur trioxide formation, a higher stack for better smoke dispersion, a faster stack gas emission rate, a higher stack gas temperature, a constant operation of the boiler to prevent pressure variance in the flue and stack, elimination of dead space, better ventilation, and a stable temperature in the flue and stack. The flue was remodelled from a descending type to an ascending type and the corners were rounded. The flue from the boiler pipe was attached above the horizontal multipipe flue in order to avoid smoke turbulence and gas pressure. Refractory bricks closed one of the flues from the horizontal multipipes which were not in use. In order to improve combustion and to keep the temperature stable at approximately 700 C, refractory bricks were used to line the flue. The conductive surface was reduced by the use of bricks, but the combustion condition was improved. At the entrance of the stack, a dust receptacle was installed under the flue. Acid smuts were sucessfully eliminated after the improvement. The total cost for remodelling was approximately $900.

15740 APTIC NO. 33653

Naruse, Y.

VARIOUS PROBLEMS IN DESIGNING OF HIGH TEMPERATURE-HIGH PRESSURE PIPE INSTALLATION. *(Koon-koatsu haikan no sekkeijo no shomondai). Text in Japanese. Preprint, Japan Petroleum Institute, Tokyo, p. 13-20, 1971. (Presented at the Seminar on Heavy Oil Desulfurization Apparatus, Tokyo, Japan, March 22-23, 1971, Paper 3.)*

Problems in designing of the piping installation in the direct desulfurization system at an oil refinery are discussed. The structure and working principles of process flow are explained. Design specifications for the direct desulfurization system include operating considerations of temperature, and sulfur content in the material and product. Materials, calculation methods, and general characteristics of pipes, fitting, flanges, bolts, gaskets, and valves, are discussed. Methods for cutting cost and increasing efficiency are examined.

15741 APTIC NO. 33512

Navarro, G.

PURIFICATION DEVICE FOR COMBUSTION GAS. *(Dispositif epurateur de gaz de combustion). Text in French. (Assignee not given.) French Pat. 1,582,910. 6p., Oct. 10, 1969. (Appl. July 29, 1968, 11 claims).*

This invention covers a device for purification of exhaust gases from internal combustion engines, taking into account the fact that the maximum degree of local pollution arises at the location of intersections where automotive vehicles stop when coming to red traffic lights. The device comprises a reservoir containing a lime solution for absorbing the carbon monoxide. The reservoir is connected to the exhaust pipe of the engine. A system of flaps is provided for controlling the emerging exhaust gases, so that they are either deflected into the purification tank, or pass straight through to the exhaust gas outlet. The control system includes one flap for admitting outside air into the tank, or shutting it off. The flaps are controlled from the engine in such a manner that when the vehicle stops with the engine running, such as at an intersection with traffic signals, the flaps are closed, causing the gases to pass through the lime solution, where they combine to form a carbonate of the monocalcic type. As soon as the vehicle is again set in motion, the flaps open, and the exhaust gases pass straight through to the exhaust pipe outlet. Air now enters the reservoir, and the calcium carbonate is transformed into a dicalcic type, whereby carbonic gas is liberated which escapes into the open air with the exhaust gas stream. The lime solution has to be periodically drained and replaced by a new filling.

15742 APTIC NO. 33396

Nikaido, Yoshiwaka

DUST CONDUIT OF A DUST COLLECTOR. *(Shujin sochi ni okeru shujin dokan sochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 46-25982. 3p., Sept. 7, 1971. (Appl. Dec. 5, 1968, claims not given).*

Dust collectors for shifting dust emission sources have negative pressure conduit pipes for sucking in dusts, tracks that shift with the dust emission sources, and pipes that connect the sources and the negative pressure conduit pipe. The conduit pipe is covered with a rubber belt which tends to loosen with the shifting of the entire device on the tracks. This invention includes an air-tight, flexible material cover which will keep the openings of the negative pressure conduit pipe airtight and magnet suction material on the rubber belt which will prevent the loosening of the cover with the shifting of dust emission sources.

15743 APTIC NO. 33416

Noda, Hiroshi and Shigeo Asano

DRIVE MECHANISM OF AIR BLOWER FOR DUST COLLECTOR. *(Shujin yo sofuki no kudo sochi). Text in Japanese. (Daido Seiko K. K. (Japan)) Japan. Pat. Sho 46-24545. 2p., Aug. 24, 1972. (Appl. Nov. 13, 1968, claims not given).*

The capacity of an air blower incorporated in a dust collector is usually determined by the maximum volume of gas handled. To reduce operating costs, blower suction volume is reduced when exhaust gas volume is below the maximum. This adjustment in suction volume is usually achieved with a damper system or by controlling blower rpm. A new blower-drive mechanism features two electric motors with different poles. The motors are connected in series, one being the main motor with larger output and the other the auxiliary motor with smaller capacity. The main motor is operated when gas volume is large and the auxiliary motor when volume is low. The two-motor system is used most advantageously with dust collectors for steelmaking arc furnaces, where gas emission fluctuates drastically and can generally be classified into two volume levels. An air blower with a 4-p 170-kw main motor and a 6-p 75-kw auxiliary motor will reduce the annual operating cost for an arc-furnace dust collector with a capacity of 1200 cu m/mm substantially below that of the damper (vane controller) and rpm control systems. Electric power costs are estimated to be $5208.00 for the two-motor system; $7112.00 for the damper system, and $6132.00 for the rpm control system.

15744 APTIC NO. 34296

Nojima, Takeo

ALL PURPOSE DUST COLLECTOR. *(Banno shujin sochi). Text in Japanese. (Nagase and Co., Ltd. (Japan)) Japan. Pat. Sho 46-15397. 3p., April 24, 1971. (Appl. April 15, 1968, 1 claim).*

A new dust collector is described which avoids the disadvantages of wet collectors which chemically affect the dust components, making it impossible to recover useful materials, and the difficult maintenance of dry collectors in which dust adheres to the walls. Several rollers operated by driving gears are installed in the tubular casing of the present device. Exhaust gas or smoke is first blown toward the inner walls of the casing by the centrifugal force produced by vane wheels of the central shaft. Dust contained in the gas is collected by ropes charged with static electricity as they are run through the rollers turning at a very high speed. The ropes then go through a spacer which eradicates the electricity in order to let the dust drop off. Wet dust is removed by a scraper, and the fallen dust is discharged by a conveyor from the casing.

15745 APTIC NO. 33618

Oda, Takeshi

INCINERATION OF PLASTIC WASTES. *(Plastic haikibutsu no shokyakushori). Text in Japanese. Preprint, Reutilization of Resources Technical Assoc. (Japan), 17p., 1970. (Presented at the Seminar on the Reutilization of Resources Technology, 1st, Japan, Aug. 1970.)*

Estimates for 1975 indicate that 15-20% of the total plastic wastes will be thermosetting resins, 80-85% thermoplastic resins, with 30% of the total wastes being contributed by polyvinyl chloride. Experimental results from the thermal decomposition of plastics are presented. Toxic wastes and, in particular hydrogen chloride, are generated by the dry distillation of crushed wastes at 280 C; then the residues are completely incinerated with stable heating and without corrosion to the furnace. After the removal of dust, the exhaust gas will not cause air pollution problems. Advantages of this process are cited.

15746 APTIC NO. 33408

Ogawa, Kouichi

DIRECT SULFUR REMOVAL PROCESS FOR HEAVY OIL. *(Juyuchokuryu datsuryuhou). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 46-30103. 3p., Sept. 1, 1971. (Appl. Jan. 1, 1969, 1 claim).*

A process is described for the direct extraction of sulfur compounds from heavy oils by a surface-active agent with a polyoxyethylene base and heating. The oil to be treated and the surface-active agent are mixed together, heated, and circulated in a reactor. The mixed liquid separates into a refined heavy oil and a liquid with the surface-active agent plus the removed sulfur. After addition of water and air or carbon dioxide gas, the sulfur contained in the latter liquid begins to settle out in the separator. The liquid is then filtered through activated carbon to be returned to the reactor. The sulfur can be removed to 0.3% within three hours. Heat for the reaction can be provided by waste heat and, since the catalyst is reused, it is not costly. Asphaltene or carbon and organic metallic compounds do not interfere with the reaction.

15747 APTIC NO. 33347

Oglesby, Sabert, Jr.

ELECTROSTATIC PRECIPITATORS TACKLE AIR POLLUTANTS. *Environ. Sci. Technol., 5(8):766-770, Sept. 1971.*

The largest single use of electrostatic precipitators is controlling fly ash emissions from coal-fired electric power boilers. The most significant properties of fly ash are its resistivity, particle size, and cohesiveness. If the resistivity is high, the current and voltage at which the precipitator can operate are reduced; if the resistivity is low, excessive reentrainment of the dust can occur. Resistivity of fly ash is dependent on the properties of coal and ash and on flue gas temperature. One solution to the high resistivity problem is reducing flue gas temperature to increase moisture and sulfur trioxide adsorption on the fly ash surface. An alternate approach to reducing gas temperature is increasing combustion air flow through the air heater and discarding excess air or using it to reheat the flue gas. Other approaches are cited. During recent years, there has been a decided trend toward installing a precipitator ahead of the air heater in electric power generating plants. Advantages of these hot precipitators are mentioned. Controlling effluents from recovery boilers in the pulp and paper industry constitutes another large application of electrostatic precipitators. Metallurgical uses, wet precipitators, cement kiln applications, and municipal incinerators are also discussed. Future applications are considered.

15748 APTIC NO. 33405

Okada, Teigo, Nobuyoshi Tsuboi, and Takashi Tsutsui

DUST-COLLECTION DUCT FOR INERTIA TYPE AIR FILTER. *(Kansei bunrigata firuta yo hoshu dakuto). Text in Japanese. (Hitachi Ltd., Tokyo (Japan)) Japan. Pat. Sho 46-24546. 2p., Aug. 24, 1971. (Appl. Sept. 18, 1968, claims not given).*

Dust removed from air by inertial separation is sent into a dust-collection duct and discharged by a blower. Since various kinds of dust and impurities can adhere to the inner walls and accumulate, a new type of duct has been designed to prevent dust from depositing on the inner walls of the duct. Dust separated from the air moves toward the dust-collection duct while colliding against a partition plate and louver door plates. Since the upper side of the duct smoothly curves downward, the carrier air thus flows along the curved side and avoids dust which has possibly accumulated on the duct walls. The main filtering unit tapers from the air intake port to the rear where the newly designed dust-collection duct is connected by a coupling frame and screws. Louvers are at both sides of the filter unit, and the vertical partition plate fits inside the center of the unit.

15749 APTIC NO. 33918

Okumura, Eijiro and Hiroyasu Matsumoto

DESIGN OF FLOATING SCRUBBER AND TURBULENT ABSORBER. *(Shisshiki shujin oyobi gasu kyushu sochi no sekkei - Furotingu sukurabba, taburento abusoba ni tsuite). Text in Japanese. Kagaku Sochi (Plant and Process), 9(10):11-22, Oct. 1967. 4 refs.*

The Floating Scrubber (FBWS), wet type dust collection device, and the Turbulent Absorber (TCA), a gas absorption device, were discussed including their basic mechanisms, construction, and design theories. Practical applications include dust removal in iron manufacturing plants; dust removal, sulfur dioxide recovery, and gas absorption in pulp factories; dust removal in steel manufacturing dust removal in sulfuric acid manufacturing plants; absorption of SO_2 from waste gas in H_2SO_4 manufacturing plants; recovery of fluoride compounds from waste gas phosphoric acid manufacturing industry and from waste gas in aluminum manufacturing industry. Both the FBWS and TCA are scrubber columns filled with lightweight plastic balls between two grids. The washing liquid is sprayed through a nozzle from above and the gas to be treated is fed in from below; the gas causes a violent turbulent motion as it ascends to contact the wash liquid. Since the gas-liquid contact system occurs in the space between the two grids, the balls contact the media, float with the gas and liquid. Since the gas-liquid contact system occurs in the space between the two grids, the balls contact the media, float with the gas and liquid, revolve, and hit each other, thus causing stirring. This keeps the surface of the balls clean so that a new liquid film can form. Also, the area of contact between the gas and the liquid is enlarged for effective dust collection and gas absorption. The constant stirring keeps the grid meshes free from viscous or other substances formed by the absorption reaction. This is known as self-cleaning. Both FBWS and TAC are patented to UPO of the U.S.A. and feature no clogging, even with viscous substances; low pressure loss compared with its high gas velocity; higher contact effect resulting in higher efficiency; and stable and long-life performance.

15750 APTIC NO. 33596

Ono, Kaoru and Masashi Kamata

VARIOUS PROBLEMS IN DESIGNING OF HIGH TEMPERATURE-HIGH PRESSURE CONTAINERS. *(Koonkoatsu yoki no sekkei-jo no shomondai). Text in Japanese. Preprint, Japan Petroleum Institute, Tokyo, p. 3-8, 1971. (Presented at the Seminar on Heavy oil Desulfurization Apparatus, Tokyo, Japan, March 22-23, 1971, Paper 1.)*

Problems in designing and manufacturing high-temperature high-pressure containers for heavy oil desulfurization apparatus are reviewed. The designing of direct desulfurization system is bound by strict specifications because of the high concentration of hydrogen sulfide involved. Various types of single-layer and multi-layer apparatus structures are explained. Calculation methods for thicknesses of single and multi-layer containers based on the safety ratio calculated on the resilience of the material, are given. The material must be selected with regard to suitability for welding, welding method, the soldering material, process and method of treatment of residue heat, and inspection method of welded parts. Economic factors are discussed.

15751 APTIC NO. 33999

Onozato, Shoichi

EXHAUST GAS FILTERING SYSTEM. *(Haikigaus roka sochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 46-28770. 7p., Oct. 5, 1971. 1 ref. (Appl. Feb. 2, 1968, 1 claim).*

The device filters exhaust gas and collects dusts without lowering the power of an internal combustion engine. A small cylindrical box with a removable cover at one end has a gas separation chamber and a dust collection and filtering chamber. In the gas separation chamber, guide feathers separate the passing exhaust gas into dust containing heavy gas and light, clean gas. The clean gas is emittted outside of the device, and the heavy, dust containing gas is led into the collection and filtering chamber. When dust concentration is unusually heavy, the excess gas is automatically led back into the separation chamber to the guide feathers, and the gas is filtered repeatedly.

15752 APTIC NO. 33344

Orth, Helmut and Rudolf A. Riedlinger

THE COMMUNAL IMPORTANCE OF REFUSE DISPOSAL PRIMARILY THROUGH INCINERATION. *(Kommunalwirtschaftliche Bedeutung der Abfallbeseitigung insbesondere durch Muellverbrennung). Text in German. Muell Abfall, 3(5):122-130, Sept. 1971.*

An experimental incinerator for refuse disposal was set up by the city of Duesseldorf to study flue gas composition. In 0.316 cu m of flue gas the carbon dioxide content was 10^3 g/cu m, sulfur oxides0 were 0.444 g/cu m, organic acids were 0.416 g/cu m, aldehydes were 0.01 g/cu m, and chlorine was 0.432 g/cu m. The incinerator was constructed after four and a half years. The flue gases contain 12.2-13.2% CO2, 6.0-7.0% oxygen, and less than 0.5 g/cu m SO2. The gases are cleaned by electrostatic precipitators to produce a maximum allowable dust concentration of 150 mg/cu m flue gas. The incinerator cost seven million dollars to build.

15753 APTIC NO. 33688

Osumi, Kinichi, Hisakasu Tanaka and Kanemi Oku

THERMAL TREATMENT OF SEWAGE SLUDGE. REPORT II--RESULT OF OPERATION AT SUITA CITY. *(Gesui odei no netsuhori sochi noi yoru shorti). Text in Japanese. Mizu Shori Gijutsu (Water Purif. Liq. Wastes Treat.), 12(7):25-30, July 1971.*

Despite the use of a large amount of chemicals, the activated sludge method produced a dehydrated cake with about 80% water. This interfered with smooth incinerator operation. At the start of heat treatment, there was no relationship between sludge concentration and the characteristics of the dehydrated cake, the characteristics remaining constant as long as operating conditions of the vacuum dehydrator were constant. Sludge concentration affected only the period of thermal treatment. Thermal treatment of sludge lowered liquid viscosity because colloidal organics in the sludge partly melted. The diameter of sludge particulate treated was small; and, since liquid velocity was low, final velocity was high and both settlement and density improved. Sludge concentration at the outlet of the thermal-treatment condensation tank averaged 15%. The main component of the gas generated was carbonic acid (80%); other components were nitrogen, oxygen, carbon monoxide, methane, hydrogen sulfide, and an unidentified compound thought to be the source of the odor, possibly an amine, aldehyde, or mercaptan. Efforts were made to combat odor by melting the odorous gas in a low-temperature liquid in closed tanks. The treated water was of good quality, except for the degree of transparency. The thermal-treatment facilities are easy to operate and maintain, requiring a minimum of labor.

15754 APTIC NO. 33704

Otsuka, Tadao and Mitsuo Fukushima

DESULFURIZATION METHOD OF PPETROLEUM. *(Sekiyu no datsuryu-ho). Text in Japanese. (Electric Power Industry, Tokyo (Japan). Central Research Inst.) Japan. Pat. Sho 46-22751. 5p., June 29, 1971. (Appl. July 15, 1966, 1 claim).*

The new desulfurization method for petroleum improves on the method of hydrodesulfurization by the use of supersonic (ultrasonic) waves in the material oil before or simultaneously with the chemical reaction. Strong ultrasonic waves are sent into the desulfurization tank or into the conveyor pipe through transmission horns. By an ultrasonic cavitation phenomenon, oil membranes and other materials impairing complete desulfurization are destroyed and a high rate of reaction is maintained. Asphaltene, contained in heavy oil, is broken down into small particles, and the oscillation given to catalysts by ultrasonic waves prevents asphaltene from clinging to oil particles.

15755 APTIC NO. 33371

Oya, Masaaki

NOX EMISSION CONTROL METHOD FOR STABILIZED COMBUSTION SYSTEMS. *(Kotei nensho sochi ni okeru NOx no haishutsu boshi hoho). Text in Japanese. Kogai (Hakua Shobo) (Pollution Control), 6(5):2-11, Sept. 1971. 12 refs.*

The mechanism of composition of nitrogen oxides, emission sources of NOx, and methods of NOx control are discussed, mostly based on data published in the U.S.A., with reproductions of equations, tables, and graphs. For NOx control methods by combustion adjustment, low oxygen, exhaust gas recirculation, and two-step combustion are briefly reviewed. The two-step combustion supplies part of combustion air into the burner, and sends the rest elsewhere. According to one test, when 95% of the theoretical air demand was sent into the burner and 15% was sent to a supplemental air duct, NOx concentration decreased 27%, from 525 ppm to 385 ppm, in the case of gas-oil combustion. When 90% of the air demand was supplied to the burner, NOx decrease was 47%, from 580 to 205 ppm. Injection of water or steam was also effective. The amount of the load in a boiler is also related to the amount of NOx created: with a total load, NOx is 300 ppm, highest temperature 1740 C; at half load, 185 ppm and 1655 C, and at quarter load, 145 ppm and 1155 C. Chemical control methods are mostly quoted from reports of the Esso Research and Engineering Co. published by NAPCA. Experiments of using copper and alumina catalysts, simultaneous reduction of sulfur dioxide and NOx with a high rate of reduction have been reported: SO2 was reduced 95-98% and NOx 78-100% in 0.46 to 0.57 sec. Use of ammonia catalytic oxidation, platinum, vanadium, molybdenum, and nickel are effective.

15756 APTIC NO. 34282

Oya, Masaaki

STUDIES ON CONTROL TECHNIQUES OF NOX FROM STABILIZED COMBUSTION SYSTEM. *(Kotei nensho sochi kara no NOx boshi gijutsu ni kansuru kenkyu). Text in Japanese. Preprint, Industrial Public Nuisance Council, Tokyo (Japan), 7p., 1971. (Presented at the Public Nuisance Symposium, 6th, Tokyo, Japan, Oct. 20-21, 1971.)*

The influences of oxygen partial pressure, combustion temperature, boiler negative load, and nitrogen content in the fuels on the nitrogen oxides content of stack gas were examined with experiments using a small heavy oil boiler. The NOx concentration in the gas was considerably smaller than the theoretical calculation figure that was obtained. The duration of gas stagnation in the furnace and the temperature distribution in the furnace seem to be the reason for this phenomenon. Within the temperatures 1550 to 1850 K, NOx concentration was 250 to 390 ppm and proportionate. When oxygen partial pressure was increased, NOx concentration decreased because of the drop of the combustion temperature; however, under the same temperature, NOx content tended to increase when O2 partial pressure was increased. NOx concentration increased when the N content in fuel was increased; however, the NOx increase was relatively small compared to the N content in the fuel. As control methods for NOx in the stack gas, improvement of combustion methods by low oxygen combustion, emission gas recirculation, and two-stage combustion would be effective. As chemical methods of NOx elimination, the use of methane, hydrogen, ammonia, or alkaline solution absorption, may be examined.

15757 APTIC NO. 33360

Patton, W. G.

NEEDED: THE RIGHT ALLOYS TO TAME AUTOMOBILE EXHAUST EMISSIONS. *Iron Age, 208(14):44-49, Sept. 30, 1971.*

The ultimate control of automobile exhausts (hydrocarbons, carbon monoxide, and nitrogen oxides) will require alloys to produce thermal reactors and catalytic converters. A projected 15 million lb/million cars of nickel and chromium are needed to reduce emissions according to government standards. The amount of alloy needed for a reactor, fed by lean or rich fuel-air mixtures, depends on operating temperature, resistance to hot-cold cycling and thermal fatigue, and formability. A low grade stainless steel will be required for the catalytic converter shell. A platinum catalytic converter, which oxides hydrocarbons and CO to produce carbon dioxide and water vapor, is examined. Possible alloys are reviewed with respect to efficiency and maintenance, and the problems involved in finding suitable catalysts are examined.

15758 APTIC NO. 33819

Peisert, Donald C. and Henry F. Mozina

THE CHALLENGE OF AIR POLLUTION CONTROL. *Wire J., 4(11):47-51, Nov. 1971. (Presented at the Wire Association, Annual Convention, New York, N. Y., Oct. 26, 1970.)*

By recycling the heat from incinerated smoke and solvent, magnet wire enameling ovens are fired at almost no operating cost, replacing catalysts. There is, of course, the capital cost of the direct thermal oxidizer, but smoke and solvent effluents from the oven are reduced to compliance levels, the object of the control effort. Temperature, time, and turbulence are the three basic parameters in a thermal oxidizer. Construction of the oxidizer and system engineering are discussed. At the present time most wire enameling ovens are designed with an internal catalyst which serves two purposes: one is the reduction of the hydrocarbon effluents and the second is to utilize the thermal energy provided by the burning hydrocarbons to reduce the volume of fuel gas required. A prototype is outlined of the adaption of a thermal oxidizer to an oven as the energy source. Synchronized dampers are indicated. (Author abstract modified)

15759 APTIC NO. 34026

Plumley, A. L.

FOSSIL FUEL AND THE ENVIRONMENT -- PRESENT SYSTEMS AND THEIR EMISSIONS. *Combustion, 43(4):36-43, Oct. 1971. 21 refs. (Presented at the Energy, Environment and Educational Symposium, Tucson, Ariz., April 5-7, 1971.)*

The combustion of fossil fuels in stationary sources accounts for an annual emission of about nine million tons of particulate matter, over 24 million tons of sulfur oxide, and 10 million tons of nitrogen oxides. Efforts to reduce emissions of sulfur oxides are prompted by their damaging effects on plant life and possible adverse health effects. From the equipment operator s standpoint, sulfur oxides can be detrimental since they contribute to corrosion and deposit problems in the boiler. Techniques have been developed for control of sulfur trioxide by means of low-excess air and/or additives. Sulfur dioxide control can be accomplished by use of low sulfur fuel, fuel desulfurization, and removing the SO2 from the stack gas. Oxides of nitrogen are air pollutants because of their participation in the reactions leading to photochemical smog. Since the localities most subject to photochemical smog are in oil and gas burning areas, most of the work has been done on these fuels. The emission of oxides of nitrogen can be significantly reduced by use of a suitable firing method to control the time-temperature relationship, low excess air firing, or an alternate fuel. Boiler particulate emissions have been gradually reduced over the years by improvements in the combustion process. Particulate size distribution and the use of collection equipment such as settling chambers, cyclones, electrostatic precipitators, scrubbers, and fabric filters are considered. (Author summary modified)

15760 APTIC NO. 33394

Porzel, Werner and Wolfgang Koennecke

EXPERIMENTS FOR THE PRODUCTION OF INERT GAS FROM THE WASTE GASES OF A NITRIC ACID PLANT. *(Versuche zur Herstellung von Schutzgas (Inertgas) aus den Abgasen einer Salpetersacureanlage). Text in German. Chem. Tech. (Berlin), 23(9):537-539, Sept. 1971. 9 refs. (Presented at the Konferenz fuer Mineralduenger, 2nd, Varna, Bulgaria, Oct. 24-27, 1970.)*

Waste gases from nitric acid plants contain varying quantities of nitrogen oxides, e.g., 0.25-0.40% nitric oxide plus nitrogen dioxide at pressureless absorption and 0.1-0.25% NO plus NO2 at absorption under increased pressure. The waste gases also contain two to three percent oxygen and small quantities of water vapor. A process is described for removing the toxic nitrogen oxides and obtaining an inert gas for use in processes where oxidation is not desired or where there is risk of explosion. Hydrogen is the preferred reducing agent since water vapor is the only reaction product. Waste gas with a pressure of 4000-mm water is mixed with the hydrogen to which a pressure of 2000-mm is applied. The gas mixture is preheated, then passed to a palladium catalyst, and afterward to a cooler. The nitrogen produced leaves the cooler at 25 C. At a catalyst load of up to 25,000 cu m/ hr cu m, the obtained inert gas contains no nitrogen oxides. Small quantities of ammonia that develop are removed by the cooling water. There is a small surplus of 0.2-0.4% hydrogen in the end product.

15761 APTIC NO. 33840

Powlesland, J. W.

AIR CURTAINS. *Can. Mining J., 92(10):84-93, Oct. 1971.*

An air curtain is an arch of dynamic energy having sufficient momentum to resist the forces working on it and maintain its continuity across the opening it protects. A properly designed air curtain will require a large air volume at high velocity to counteract a wind as moderate as 10 mph, or the corresponding 0.05-inch static head. Air curtain design criteria are indicated. Air curtains can be produced by any centrifugal or axial fan with a supply duct or plenum. An air curtain has been used to put a roof over the primary crusher pit to contain the dust and at the same time push it over the exhaust opening on the far side. The basic approach to a second problem, welding fume control in a truck repair ship, is also indicated. Ductless exhaust is discussed.

15762 APTIC NO. 34083

Purcell, P. R. and T. H. Williams

THE EXTRACTION OF SULPHUR FROM COKE-OVEN GAS AND THE MANUFACTURE OF SULPHURIC ACID. *Iron Steel Inst., London, Spec. Rept., no. 61:56-61, 1958. (Presented at the Iron and Steel Institute, Air Pollution Meeting, London, England, Sept. 25-26, 1957.)*

An account of the Collin process shows that desulfurization of the coke-oven gas, combined with the manufacture of sulfuric acid from the recovered hydrogen sulfide by the Chemiebau wet contact process, has been introduced with success on the coking plant at Corby in Britain. The type of process which was installed at Corby is an absorption-desorption process using ammonia liquor as a scrubbing agent. The absorption is carried out in unpacked towers so that no excessive additional load is placed on the gas exhausters, and the concentration of the ammonia liquor of about 1.5% is such that it is in equilibrium with the ammonia content of the gases and no plant for the production of concentrated ammonia liquor is required. Following the solution of the corrosion troubles encountered in the early operation of the plant, it has since worked with satisfactory consistency. Desulfurization of 70-75% is achieved and the quantity of acid produced is just about sufficient to meet the requirement for ammonium-sulfate manufacture in the by-product plant.

15763 APTIC NO. 34181

Rabecchi, Giacomo and Nicolino Saggio

METHOD AND APPARATUS FOR REDUCING THE CARBON MONOXIDE CONTENT OF EXHAUST GASES OF INTERNAL COMBUSTION ENGINES. *(Assignee not given.) Brit. Pat. 1,212,925. 5p., Nov. 18, 1970. (Appl. Nov. 15, 1968, 21 claims).*

The method described comprises adding to the air/fuel mixture downstream of the carburetor or other mixer and before entry into the engine, air enriched with free molecules or ionized groups of molecules of propylenic dihydric alcohol, a derivative of ethylene or propylene oxide or a copolymer of polypropylene glycol or of polyethylene glycol. The apparatus includes a reservoir for containing an enriching liquid, and a means for passing air, and removing air droplets from the liquid.

15764 APTIC NO. 33954

Riley, H. L.

THE COMPLETE ELIMINATION OF DUST FROM GASES AT 300-400 C. *Iron Steel Inst., London, Spec. Rept., no. 61:129-131, 1958. 3 refs. (Presented at the Iron and Steel Institute, Air Pollution Meeting, London, England, Sept. 25-26, 1957.)*

Entrainment of finely divided solids in the gas issuing from a fluid bed necessitates the use of solids-recovery equipment. In fluidized-catalyst reactors using expensive catalysts, it is not possible, in some cases, to tolerate the loss of any catalyst whatever, because of the danger of serious atmospheric pollution and the high cost of catalyst replacement. This has created a need for filters capable of operation at high temperatures and with a low pressure drop, and which give 100% solids filtration. A filter is described which consists of a number of units, each of which is made from a perforated steel cylinder having a spigot at each end. The upper spigot is threaded and connects to a collector-box manifold. The lower spigot is closed. The perforated steel tube is encased in a number of successive layers of fiberglass materials. There are alternate layers of continuous-filament glass cloth and glass-fiber mat. Gas filtration at very high temperatures is discussed.

15765 APTIC NO. 34185

Robinson, I. C. H.

AIR POLLUTION FROM GASOLINE-ENGINED VEHICLES. *Chem. Ind. (London), no. 6:182-183, Feb. 7, 1970.*

Carbon monoxide, hydrocarbons, and in the future, nitrogen oxides emissions from automobiles are subject to control in many countries. To determine exhaust emissions during transient engine operating modes, continuous monitoring of the exhaust gases is necessary. Nondispersive infrared methods are suitable for determining CO and NO, but have limitations when applied to the measurement of total hydrocarbons. By using a flame ionization detector, an analyzer has been developed which accurately measures the total hydrocarbon content of exhaust gases. It has been found that variations in fuel properties have a relatively small effect on overall vehicle emissions. As a means of achieving better mixture quality under all operating conditions, the preparation of fuel/air mixtures and their distribution between the engine cylinder is being studied. Lean-mixture operation is a solution to the CO and hydrocarbon problem, but increases NO emissions. Nitric oxide formation is a function of peak cycle temperature and oxygen availability. Current approaches to the problem are concentrating on reducing the cycle temperature. However, lower temperatures mean lower cycle efficiencies. Possible alternatives for inhibiting NO formation and accelerating its decomposition are being studied.

15766 APTIC NO. 33476

Robson, Fred L. and Albert J. Giramonti

THE USE OF COMBINED-CYCLE POWER SYSTEMS IN NONPOLLUTING CENTRAL STATIONS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 28p., 1971. 12 refs. (Presented at the Air Pollution Control Association Annual Meeting, 64th, Atlantic City, N. J., June 27-July 2, 1971. Paper 71-13.)*

The most effective and economical means of reducing objectionable effluents from future fossil-fueled power stations appears to be gasification of high-sulfur fuel for use in a combined gas turbine and steam (COGAS) power system. Recent and prospective advances in military and commercial aircraft gas turbine technology, particularly in the area of high-temperature operation, can be applied to industrial gas turbines to yield the high-performance, low-cost, and long-lifetime characteristics desired for base-load power generation. Sulfur, ash, and other fuel constituents potentially harmful to gas turbines and the environment would be removed during the gasification and cleanup process. A fixed-bed pressurized gasifier is commercially available, but more advanced fluidized-bed processes that were not demonstrated on a large scale offer the promise of future performance improvements and cost reductions. Economic and performance analyses show that future nonpolluting COGAS power stations have net installed costs, including the gasification systems, approximagely 20% less than conventional steam stations without pollution control while having overall efficiencies nearly 20% higher than conventional stations. The busbar cost of power from the COGAS system would be about 10% less. The emission of nitrogen oxides should also be significantly reduced through the use of COGAS systems. Because of the increased efficiency and the high percentage of heat rejection directly to the atmosphere, thermal pollution of cooling water would also be reduced. (Author abstract modified)

15767 APTIC NO. 34187

Rohac, Ivan and Rene Keller

A SYSTEM FOR PURIFYING EXHAUST GASES OF INTERNAL COMBUSTION ENGINES. *(Ustav Pro Vyzkum Mororovych Vozidel, Prague (Czechoslovakia)) Brit. Pat 1.184.991. 4p., March 18, 1970. (Appl. Nov. 3, 1967, 6 claims).*

A system for purifying the exhaust gases of multi-cylinder, spark-ignition internal combustion engines is described. The harmful components of the exhaust gases, particularly carbon monoxide and hydrocarbons, are oxidized by direct contact of secondary air with the hot exhaust gases. The exhaust ports of the engine are connected to the branches of an exhaust manifold. A tube for introducing air is projected into each branch. Each tube has a distribution head with outlet ports at its end within the branch. The distribution heads and outlet ports should be shaped so that the flow of exhaust gas through the branches causes the air to be withdrawn through the ports. This system achieves a higher purification effect, since an afterburning space is provided within the exhaust manifold. Crankcase vapors can also be added to the secondary air for burning.

15768 APTIC NO. 34273

Sakai, Y., H. Miyazaki, S. Tsutsumi, T. Mukai, and M. Saito

COMBUSTION ANALYSIS BY SINGLE-CYLINDER ENGINE. (REPORT NO. 2), INFLUENCES OF STROKE BORE RATIO AND COMPRESSION RATIO ON NOX.

(Tanto enin ni yoru nensho kaiseki (dai niho) NOx ni oyobosu kotei naikeihi, asshukuhi no eikyo). Text in Japanese. Preprint, the Society of Automotive Engineers of Japan, Inc., Tokyo, p. 95-104, May 1971. 4 refs. (Presented at the Society of Automotive Engineers of Japan, Academic Conference, Tokyo, Japan, May 1971.)

Experiments were carried out in order to study the influences of design variants on engine modification system under a given load condition. A water-cooled single cyclinder engine of 399 cc, 73.8 mm stroke, 83 phi inner diameter, and 8.5 compressing ratio, with a fuel injection system was used for the experiments. The abrasion average efficiency pressure (Pf) when the engine was warm, and the shaft average pressure (Pe) when the car was ignited and operating, were measured, and as the load condition, a graphic average efficiency pressure Pi was calculated as Pe plus Pf. The exhaust quantity was calculated from the suction air weight and gas concentration. Influences of air-fuel ratio and stroke-diameter ratio were examined, the relationship between the latter and nitrogen oxide and hydrocarbon content, and the relationships between fuel consumption and NO, HC content were examined. Influences of compression ratio and ignition time were examined and the relationship between graphic average efficiency pressure and NO and HC were obtained. At a given fuel consumption and horsepower, the larger the stroke-diameter ratio, the smaller the weights of NO and HC; but when the compression ratio was larger, HC weight was larger, but NO weight was smaller. The NO weight could be decreased by reducing the air supply and postponing ignition time.

15769 APTIC NO. 34074

Sakamoto, Shizuo

METHOD OF COMBUSTION AND SINTERING DISPOSAL OF INDUSTRIAL WASTES. *(Sangyo haikibutsu no shyokyaku shosei shori). Text in Japanese. Preprint, Reutilization of Resources Technical Assoc. (Japan), 14p., 1971. (Presented at the Seminar on Reutilization of Resources Technology, 2nd, Japan, July 12-14, 1971.)*

A four-stage fluid incinerator was used for the disposal of old tire and synthetic rubber scraps. Inside the first incinerator chamber, a stirring arm rotates slowly; the combustion air is blown out through the many holes in this arm. The burner in the first chamber is used only for ignition, while the old tire and rubber scraps are completely burned in the second chamber. The air is blown into the second chamber from above and below. Waste oil and solvents can be burned together with solid inflammables in the second chamber. The third and fourth chambers keep the gases until they burn completely, and prevent the emission of black smoke and separate out the ash. The high temperature gas which comes out of the fourth chamber is cooled with sprayed water and emitted from a stack by a blower. A blast furnace can be used to burn wet sludge at 41 kg/hr at 900-1000 C; zinc can be recovered. An electric sludge incinerator is also described.

15770 APTIC NO. 33616

Sato, Mitsuo, Naoki Takayama, Satoru Kurita, and Takao Kwan

DISTRIBUTION OF VANADIUM AND NICKEL DEPOSITS INSIDE THE DESULFURIZATION CATALYSTS. *(Banajiumu oyobi nikkeru no datsuryu shokubai tainai eno chinseki bunpu). Text in Japanese. Nippon Kagaku Zasshi (J. Chem. Soc. Japan), 92(10):834-838, Oct. 1971. 6 refs.*

The poisoning of desulfurization catalysts was investigated. Samples were taken from the middle of a two m long cobalt-molybdenum-alumina catalyst employed for the hydrodesulfurization of Kafuji oil in a fixed-layer reactor. X-ray analysis revealed nickel deposits to be distributed uniformly throughout the catalyst, while vanadium deposits were found in the vicinity of the surface of the catalyst. No difference was observed between those catalysts used for 50 hours and those used for 1000 hours. The rate of deposition was considered linearly proportional to the concentration of the compounds, and the reaction to be reversible. Once deposited, the compounds did not escape from the surface, nor move around on the surface or inside the catalyst. The deposition process is independent of the hydrodesulfurization process. Based on these assumptions, a theoretical model was derived of the deposition process. The reactivity of vanadium with the catalyst was greater than that of nickel, while the diffusion coefficient was lower for vanadium than for nickel.

15771 APTIC NO. 33898

Schade, Helmut

A GAS PURIFICATION PROCESS. *(Procede pour l epuration des gaz). Text in French. (Aug. Kloenne, Dortmund (West German)) Belg. Pat. 618,859. 11p., June 13, 1962. (Appl. July 1, 1961, 3 claims).*

A gas desulfurization process is described which achieves desulfurization by bringing the waste gas to be purified into intimate contact with a gas containing suspended particles of granulated zinc oxide, hydroxide, or carbonate, or a mixture of these zinc compounds with compounds of iron, manganese, alkaline earth metals, or silicon in a system of tubes at 400 C. By regulating their velocity, the two gases are mixed concurrently or countercurrently in such a manner that the suspended particles travel at a different speed from the gas to be purified. Following interaction with sulfur dioxide and hydrogen sulfide, the suspended particles are collected and removed from the process to be regenerated (by roasting) and reused. A gas containing four vol % H2S, 1.8 vol % SO2, 40% water vapor, 34.2% nitrogen, and 20% carbon dioxide can thus be desulfurized by 98%.

15772 APTIC NO. 33593

Seidl, Walter

MAINTENANCE OF CLEAN AIR IN THE UNITED STATES. *(Luftreinhaltung in den USA). Text in German. Umwelt (Duesseldorf), 1(5):28-34, Oct./Nov. 1971.*

The new control agencies were created on the Federal level in the U. S., the Council on Environmental Quality and the Environmental Protection Agency. The Federal Air Quality Act was passed and heavily polluted areas were declared Air Quality Control Regions. Ninety such regions existed at the end of 1970. The heaviest air polluter is the traffic (more than 40%), followed by power plants. A total of 200 megatons are emitted annually. Fifteen years ago, dust emissions in Germany were estimated at two million tons/year, half of it from the Ruhr Area. All measures taken with respect to reduction of exhaust gas emission by automobiles have not been enough to stem the rising pollution caused by the increase in the number of automobiles. The real solution to this problem lies in entirely new engines. The electrostatic precipitator is the preferred dust collection method. Its use provides some difficulty when low-sulfur coal is used as fuel because the fly ash possesses extremely high electric resistance. A prerequisite to all meaningful measures are accurate measurements. Extraordinary sensitivity can be achieved with neutron activation analysis. Telemetry is gaining increasing importance for monitoring many sources from one single stationary or mobile station.

15773 APTIC NO. 33997

Seito, Mikio

ELECTROSATIC PRECIPITATORS. *(Denki shujin sochi). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 8(10):566-568, Oct. 1971.*

Characteristics and structure oa an electrostatic precipitator, especially designed for exhaust gases from cement kilns with suspension preheaters, are briefly discussed. Dust collection electrodes, discharge electrodes, rapping devices, gas flow adjustment, the outer shell, the high voltage power source, and humidity adjustment are separately discussed. Electrostatic precipitator damage often occurs when discharge wires break. In this precipitator, a particularly thick wire is used, insuring durability and strength, and the mechanical contact of the discharge line is solidified by welding, and joints are uniquely structured. There has not been an accident in the past five years. One of unique features is the humidity adjustment. The exhaust gas from the kiln goes into the flue between the first and the second cyclones, and the heated and dense suspended dust particles are sprayed with jet water. Water is completely gasified from the heat of the dust particles. Exhaust gas from cement kilns with suspension preheater is considered most difficult to clean because of its dust content (50-100 g/N cu m), extremely small particle size (90% of less than 10 micron), high electrical resistance, and high temperature (300 280 C). However, this precipitator has been able to get 99.79 to 99.93% dust collection rates.

15774 APTIC NO. 34084

Septier, Louis G.

A PILOT PLANT FOR THE REMOVAL OF IRON-OXIDE DUST FROM THE FUMES ARISING IN THE PRE-REFINING OF IRON WITH OXYGEN. *Iron Steel Inst., London, Spec. Rept., no. 61:74-81, 1958. (Presented at the Iron and Steel Institute, Air Pollution Meeting, London, England, Sept. 25-26, 1957.)*

For the ladle refining of iron, particularly when using oxygen for pre-refining iron and steel, a pilot plant was developed for the precipitation of iron oxide particles, which would be troublesome if discharged into steelwork sheds or the atmosphere. The pilot plant for dust removal consists of a dry and wet cleaner in series, the essential features of the latter being a venturi scrubber. The largest particles are collected and the fumes are cooled during the preliminary dry purification. The purifier is composed of 49 cells of honeycomb form; each compartment has a vane at the entrance, giving a centrifugal motion to the thin streams of gas. In addition to the venturi, the wet purification utilizes a washing tower and a cyclone. Measurement of concentrations of solid particles in the fumes presents a difficult problem on account of the high temperature, and has made it necessary to devise a special apparatus.

15775 APTIC NO. 34090

Servus, Stanislav, Jaroslav Zizka, and Zdenek Cvrk

INSTALLATION FOR SEPARATION OF DISPERSED AND GASEOUS COMPONENTS FROM GASES. *(Zarizeni k odlucovani dispergovanych a plynnych slozek z plynu). Text in Czech. (Assignee not given.) Czech. Pat. 132,338. rp., May 15, 1969. (Appl. Jan. 9, 1967, 2 claims).*

Equipment for the purification of gases by a wet process is discussed. Known methods of wet purification employ scrubbers such as a venturi tube, through which the gas is led and where the cleaning fluid is injected at high pressure. The disadvantage of such a construction is the incomplete contact of the spray with the gas, and thus the impossibility of attaining complete cleaning of gases with a substantial content of impurities. The present invention overcomes these shortcomings by a design which incorporates one or more venturi tubes of rectangular cross section which divide the space of the separator into two parts. The front wall of the venturi tube forms the rear wall of a multi-story column, comprising an inlet chamber as the first story, a second floor having openings permitting cleaning fluid to drip through, and a third floor contains orifices which direct the stream of purified gas and a second supply of cleaning fluid into the mouth of the venturi tube or tubes. On leaving the separator outlet chamber, the gas passes through a drip catcher. The principle of operation is to effect purification in two stages, by using part of the cleaning fluid supply for the first stage contact, and the second part for the cleaning action within the venturi tube or tubes. The waste fluids leave the apparatus through bottom connections.

15776 APTIC NO. 33663

Sforzolini, G. Scassellati, and A. Savino

THE ACTION OF OZONE ON SOME CHEMICAL PARAMETERS OF ENVIRONMENTAL POLLUTION. *(Azione dell ozono su alcuni indici chimici di inquinamento degli ambienti continati). Text in Italian. Riv. Ital. Igiene (Pisa), 29-30(3-4):174-190, May-Aug. 1970. 18 refs.*

The action of ozone on several chemical indices of environmental contamination by cigarette smoking and auto exhaust gases was studied. Ozone in 0.05 ppm concentrations reduced the carbon monoxide content in room air contaminated by cigarette smoke and oxidized the aldehydes in small amounts but had no effect on the nicotine concentrations. In garage air, ozone oxidized the CO.

15777 APTIC NO. 33477

Shale, C. C., D. G. Simpson, and P. S. Lewis

REMOVAL OF SULFUR AND NITROGEN OXIDES FROM STACK GASES BY AMMONIA. *Preprint, American Institute of Chemical Engineers, New York, 19p., 1969. 16 refs. (Presented at the American Institute of Chemical Engineers, Annual Meeting, 62nd, Washington D. C., Nov. 16-20, 1969.)*

Complete removal of sulfur dioxide and partial removal of nitrogen dioxide impurities from a simulated stack gas mixture was effected in laboratory experiments by vapor phase reaction with ammonia. The cyclic process utilizing ammonia involves recovery of the chemical reaction products by condensation and regeneration of the feeds by thermal decomposition and reaction of acidic constituents with zinc oxide. Ammonia is separated for recycle, and essentially pure SO2 is recovered as a by-product. Ash particles not removed by mechanical separation are trapped in the condensate. A flow diagram for commercial application of this conceptual process is discussed. (Author abstract)

15778 APTIC NO. 33884

Shale, C. C. and J. H. Holden

THE ROLE OF WIRE SIZE IN NEGATIVE ELECTRICAL DISCHARGE AT HIGH TEMPERATURE. *IEEE (Inst. Elec. Electron. Engrs.) Trans. Ind. Gen. Appl., 5(1):34-39, Jan./Feb. 1969. 13 refs. (Presented at the Institute of Electrical and Electronics Engineers, Industry and General Applications Group, Annual Meeting, Chicago, Ill., Sept. 29-Oct. 3, 1968, Paper TOD 51-68, EP 68-1.)*

The high-temperature characteristics of negative corona as influenced by the pipe-to-wire ratio of radii were investigated, based on earlier studies of the high-temperature characteristics of a bench-scale electrostatic precipitator. Use of large wires at high temperatures demonstrates that onset of electrical discharge occurs at voltages significantly less than those predictable by earlier theory and that sparkover occurs at voltages considerably greater than those anticipated. Theory is presented in terms of ion mobility and the attachment and detachment of electrons to account for the results obtained.

15779 APTIC NO. 34167

Shaw, E. C. and W. L. Caughman, Jr.

THE PARALLEL PLATE INTERCEPTOR. NLGI. *(Natl. Lubricating Grease Inst.) Spokesman, 33(11):395-399, Feb. 1970. 3 refs. (Presented at The National Lubricating Grease Inst., Annual Meeting, 37th, Kansas City, Mo., Oct. 1969.)*

Installations of the Bataafse Internationale Petroleum Maatschappij Parallel Plate Interceptor have been operating at several locations in Europe since 1960. The first installation in the United States was put into service in 1965. The salient feature of the Parallel Plate Interceptor is its nearly automatic operation. Oil collected in the separator is automatically discharged to an oil sump, thus eliminating the manual skimming operation required for a conventional separator. There are other advantages over the conventional oil/water separator: oil separation is improved; evaporation of collected oil is prevented; the separator can be situated closer to processing units because of reduced air pollution and fire hazard; and the recovered oil has a lower water content. Very little maintenance or attention has been required in five years of service.

15780 APTIC NO. 34196

Shiosawa, Kiyoshige

RECENT AIR POLLUTION CONTROL MEASURES IN EUROPE AND THE UNITED STATES. *(Saikin no obei no taiki osen boshi taiksaku). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 5(2):36-43, Feb. 1970. 94 refs.*

Air pollution control measures in the United States, England, and Germany are reviewed. Automatic devices, telemeters, computers, and televisions are most effectively utilized in the United States in monitoring of pollution. Actual control is mainly left to local governments, while the federal government gives aid and guidance via a network of monitoring stations. Major sources of pollution in the United States are automobiles (60.6%), industries (16.8%), and electric power plants (14.1%). Major problem areas are represented by California (especially Los Angeles), the photochemical reaction of automobile exhaust gas creates smog and the Pittsburgh, Chicago, and New York areas, where industrial fuel causes pollution. Sulfur dioxide is not yet a major problem, but the lime (dolomite) desulfurization method is in use, and the alkaloid (almine) method is being developed. In England, pollutant are analyzed chemically rather than by an automatic measuring apparatus. Some electric power plants, managed by the city, desulfurize exhaust gas from the plant using the wet lime method, but the smoke from stacks is about 40 C and wafts at a low height. Coal, the traditional industrial fuel, is being replaced by oil because of costs. In Germany, research laboratories are investigating the influence of pollutants on plants and pollution including noise. German anti-pollution measures are developed by Verein Deutscher Ingenieure and promulgated by the federal government.

15781 APTIC NO. 33587

Shioirida, Kotaro

AIR FILTER. *(Eya firuta). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 46-25986. 2p., Sept. 7, 1971. (Appl. Dec. 9, 1968, claims not given).*

Thin metal belts are pressed into wave forms with 45 degree angles. An appropriate number of belts are arranged in parallels and are formed into a beehive-shaped filter. Both sides of the filter are covered with plastic mesh and the inside is filled with activated carbon. Polluted air will go through the mesh and pass through the carbon in a complex refracted pattern, exposing itself to the absorbent to the maximum amount.

15782 APTIC NO. 33915

Shishko, I. I., K. N. Shabalin, and V. M. Pavlov

HEIGHT OF THE FLUIDIZED BED AND STABILITY OF OPERATION OF SIEVE-PLATE GRIDS. *(Vysota kipjshchego sloja i ustojchivost Raboty proval nykh reshetok. Khim. Khim. Technol., no. 2:325-330, 1966. 6 refs. Translated from Russian by B. Bergaminis, Commonwealth Scientific and Industrial Research Organization, Sydney (Australia) 8p., Nov. 2, 1971.*

The conditions of a multistage process with complete separation of the layers of the fluidized bed by means of gas beds were investigated in the laboratory and in a pilot plant. The flow rate of the air, the resistance of the layer and the grid, and the flow rate of the free-flowing material were measured. All tests were carried out under stable operating conditions. The results show that the curves of the dependency of the self-adjusting height of the fluidized bed on the sieve-plate grids on the velocity of gas have two flat sections. The stability of the height of the bed necessary in industry would recommend operating conditions corresponding to the second flat section of the dependency curve.

15783 APTIC NO. 33925

Sigworth, E. A.

IDENTIFICATION AND REMOVAL OF HERBICIDES AND PESTICIDES. *J. Am. Water Works Assoc., 57(8):1016-1022, Aug. 1965. 5 refs. (Presented at the American Water Works Association, Virginia Section Meeting, Fort Monroe, Va., Sept. 17, 1964.)*

Herbicides and pesticides may reach potable-water supplies by aerial spraying, runoff from agricultural areas, seepage into underground supplies, misuse, and so on. Since many herbicides and insecticides are extremely odorous, even at concentrations of less than 1 ppm, they can be detected by odor. Various odors can then be used to identify the pesticides including the following: acetic acid, camphor, chlorophenol. chlorinous odors, earthy odors, garlic, horseradish, hydrocarbon, iodoform, kerosene, moldy odors, musty odors, onion, rotten cabbage, rotten-onion, and skunk. Since more than one odor characteristic is frequently mentioned for specific products, a sample of the material should be diluted and tested. Because herbicides and pesticides are toxic to both fish and warm-blooded animals, removal is necessary. Removal by coagulation with alum and iron salts is only partial. DDT is effectively removed by coagulation and filtration. Oxidation can also be used in some cases. Adsorption by activated carbon is the best removal treatment. In a laboratory study, 90% of the associated odors were adsorbed with two to 20 ppm of carbon. Carbon efficiency in the plant is usually about twice that obtainable in laboratory studies. Different amounts of carbon are needed to remove different substances. However, it seems, from limited data, that powdered activated carbon in the 10 ppm range would remove 90% of most herbicides and insecticides. The average cost to each person for such year round treatment is about 40 cents.

15784 APTIC NO. 33366

Simpson, Bruce H.

AUTOMOTIVE EMISSIONS CONTROL. *J. Wash. Acad. Sci., 61(2):128-137, 1971. 8 refs.*

Motor vehicles account for 38.9% of the total mass of manmade air pollutants in the U. S., according to a recently published nationwide emission inventory. However, when relative harmfulness of individual pollutants is considered, the motor vehicle contribution is reduced to about 12%. Current model motor vehicles emit approximately 83% less hydrocarbons and 70% less carbon monoxide than precontrolled vehicles. By 1976, vehicles are expected to reduce HC emissions by 98%, CO by 97%, and oxides of nitrogen by 90%. Motor vehicle emissions of HC and CO in the South Coast Basin have beeen reduced by 18% and 13%, respectively, from peak values which occurred during the mid-1960 s. The NOx emissions continued to increase until 1971, but are now declining. Total nationwide emissions from motor vehicles are also declining, in spite of an increasing car population. Automotive power plants for the balance of this decade will be highly refined derivatives of today s internal combustion engines. Exhaust gas recirculation, thermal reactors, and catalytic converter systems are being developed to meet future requirements, although both customer acceptance factors and emission control are not fully acceptable at this time. Lead-free fuel will be required to insure satisfactory component life, to minimize harmful effects of combustion chamber deposits, and to significantly reduce the emission of particulate matter. Major variations of the reciprocating internal combustion engine, gas turbines, Rankine cycle engines, and electric propulsion systems are also being actively developed to meet future needs for virtually emission-free vehicles. (Author abstract)

15785 APTIC NO. 34022

Slack, A. V. and H. L. Falkenberry

SULFUR-DIOXIDE REMOVAL FROM POWER PLANT STACK GAS BY LIMESTONE INJECTION. PLANT-SCALE TESTS AT TVA. *J. Eng. Power, 92(1): 5-10, Jan. 1970. 12 refs. (Presented at the American Society of Mechanical Engineers and the Institute of Electrical and Electronics Engineers, Power Conference, Charlotte, N. C., Sept. 21-25, 1969, ASME Paper 69-Pwr-2.)*

In most of the methods that have been considered for removing power plant sulfur dioxide concentrations, the gas must be slowed down and kept in contact with a sorbent material long enough for absorption or adsorption to take place. The resulting equipment must be quite large and expensive. An exception is limestone injection, which requires relatively low investment because the boiler itself is used as the reactor. Limestone is blown into the boiler where it reacts with sulfur dioxide to form calcium sulfate, a waste product that is separated from the gas stream along with the fly ash and discarded. The method has some serious drawbacks, however, including incomplete reaction of the limestone, need for a large amount of additional dust-removal capacity, and production of a solid waste. Plant-scale testing of the limestone injection method was undertaken. Limestone distribution, temperature, stoichiometry, type of limestone, particle size, catalyst, and precalcination are discussed.

15786 APTIC NO. 33382

Sommers, Hans and Werner Last

REMOVAL OF ORGANIC SULPHUR FROM COKE OVEN GAS. III. TEST RESULTS WITH TWO STEP PROCESSES. *(Entfernung von organischen Schwefel aus Koksofengas. III. Ergebnisse der Versuche mit zweistufigen Verfahren). Text in German. Erdoel Kohle (Hamburg), 24(9):578- 586, Sept. 1971. Part I. Ibid., 24 (7):473-477, July 1971. Part II. Ibid, 24(8):525-529, Aug. 1971.*

For the hydrogenation of organic sulfur compounds to hydrogen sulfide, a four percent cobalt oxide and 12% molybdenum trioxide catalyst with a five percent nickel oxide and 11.5% molybdenum trioxide catalyst were used in a two-step removal process. The catalysts had a bulk weight of 690-760 g/l and a specific surface of about 250 sq m/g. A third catalyst with about one percent platinum on aluminum oxide was in the form of granules two to four mm in diameter; a fourth catalyst had a high nickel content. At increased pressures, the first two commercial catalysts proved to be suitable for hydrogenation. The laboratory-made platinum catalyst was suitable at atmospheric pressures. Iron compounds are recommended to replace zinc compounds for the absorption of hydrogen sulfide once it is already formed.

15787 APTIC NO. 33549

Spengler, Guenther

REPORT ON LECTURE GROUP B OF THE CONGRESS REINHALTUNG DER LUFT 1969. *Staub (English translation from German of: Staub, Reinhaltung Luft), 30(2):5-12, Feb. 1970.*

NTIS: TT 70-50047/2

Present and future sources of sulfur dioxide emissions in West Germany are examined, and data are reported for laboratory and/or industrial tests of the following flue gas desulfurization processes: Grillo AGC (absorption), Bergbauforschung (adsorption), Bischoff (alkaline additives), Sulfacid (adsorption), Additive (alkaline-earth compounds), Reinluft, and Still. Power-plant tests of four of these processes yielded disappointing results. The desulfurization rate of the additive process was only 20-30%. Efficiency of the Reinluft processes at a plant operating on soft-coal coke instead of the formerly used peat coke decreased with increasing dust content of the waste-gas stream, and fires broke out due to the low ignition point of the coke. The Still process required continuous moistening of the contact material. Results were more encouraging for the Bischoff process, which is a wet process using alkaline additives for simultaneous separation of SO2 and dust from waste gases. Desulfurization of 80-90% can be attained, and electrostatic precipitators or centrifugal separators are unnecessary because of the high degree of dust removal. A 120,000 cu m STP/hr plant will be built to determine if the process is economically feasible.

15788 APTIC NO. 33415

Stone, Charles W.

TECHNIQUES FOR SELECTING PARTICULATE AIR POLLUTANT CONTROL EQUIPMENT. *Preprint, Operations Research Society of America, Baltimore, Md., 24p., 1971. 22 refs. (Presented at the Operations Research Society of America, National Meeting, 40th, Anaheim, Calif., Oct. 29, 1971.)*

The need for particulate control equipment is well documented, but systematic methods of selecting the equipment are far from being established. Utilizing adaptive identification procedures, an idealized mathematical model of the desired control system is formulated. By applying appropriate criteria functions, geometric programming, and parameter-estimation techniques, the parameters of a feasible particulate control system are synthesized in such a way that the difference between the idealized model response and the actual system response is minimized. This selection and automated parameter adjustment procedure yields a particulate air pollutant control system which is optimal with respect to the physical and economic constraints imposed upon the system. Cost-effectiveness relationships are also included. (Author abstract modified)

15789 APTIC NO. 34098

Stork, Eric O.

VEHICLE EMISSION INSPECTION. WHERE DO WE STAND? Preprint, Environmental Protection Agency, Research Trinagle Park, N. C. and American Inst. of Chemical Engineers, New York, 6p., 1971. (Presented at the Technical Environmental Conference, 1st, San Juan, Puerto Rico, July 15-17, 1971.)

The Clean Air Act authorizes Federal grants of up to two-thirds of the cost of developing and maintaining effective vehicle emission testing and control programs. Requirements of an effective program are a short test that can be applied to warmed-up cars and that correlates resonably well with results obtained by the full Federal test procedure (FTP) and diagnostic procedures that facilitate maintenance of cars failing emission inspection. The bureau of Mobile Source Pollution Control (MSPC) of the Environmental Protection Agency is studying both a workable short test and diagnostic procedures and expects to have ready material for an up-dated Control Techniques Document for Mobile Sources. The document will present several alternatives, at varying cost levels, from which states and localities can select a program meeting their needs.

15790 APTIC NO. 33433

Stourdze-Visconti, Yvonne

OBTAINING ELEMENTAL SULFUR THE CATALYTIC PROPERTY OF VANADIUM OXIDE IN THE REDUCTION OF SULFUROUS GAS BY CARBON MONOXIDE. *(Obtencao de enxofre elementar Sobre a propriedade catalitica do oxido de vanadio na reducao do gas sulfuroso pelo monoxido de carbono). Text in Portuguese. Quim. Ind. (Buenos Aires), 14(163):22-26, Nov. 1945. 4 refs.*

For studies of the reduction of sulfur dioxide with manufacturers gas containing carbon monoxide, the literature recommended using bauxites containing iron oxides. Due to a shortage of this material, the tests were conducted instead with a pyrrholite (Fe7 S8), then with fuller s earth and with activated carbon. Although the carbon gave a good yield, too much of it was lost by combustion at the test temperature (500 C), and large quantities of COS, an undesirable product, were produced. After various other experiments with unsatisfactory results, with a bauxite impregnated with a vanadium salt. Especially good results were obtained in 197 qualitative and quantitative tests. The testing program involved the mechanism of catalysis and the influence of the ratio of CO and SO2 concentration, temperature, rate of gas flow, and the method in which the vanadium catalyst is prepared. It was found advantageous to dilute the gaseous raw material with nitrogen (58-65%).

15791 APTIC NO. 33835

Sugimitsu, Santa

ELECTROSTATIC PRECIPITATORS OF SHIMONOSEKI POWER PLANT. *(Shimonoseki hatsudensho no denki shujinki ni tsuite). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 7(10):587-590, Oct. 1971.*

The design criteria and the results of efficiency tests of electrostatic precipitators at the Shimonoseki Power Plant of the Chugoku Electric Co. are discussed. A control circulation boiler with the maximum continuous steam quantity of 540 t/hr using small particle coal and heavy oil creates 770,000 to 875,000 cu m/hr gas; the temperature at the entrance of the collector is 130 132 C, and the quantity of dust at the entrance of the precipitator is 25 g/N cu m. The dust collection efficiency is 82.5 to 89.0%. Various combinations of fuel mixture proportions were examined and coal particles with a mixture of a small amount of heavy oil dropped dust resistance drastically. The relationship between the rapping cycle and collection efficiency was examined; a 20/20 min cycle was the safest. The relationship between the electric current variation and collection efficiency was examined; an increase of currency resulted in a better collection rate. A comprehensive test of precipitators with a plant load of 156 MW, a rapping cycle of 20/20 min for 1F and 2F, an electric pressure of 42/[illegible] kV, and electric current of mA 45.5/610 resulted in a 89.6% collection efficiency.

15792 APTIC NO. 33625

Takahashi, Shiro

DUST COLLECTOR. *(Shujin sochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 46-24540. 2p., Aug. 24, 1971. (Appl. Dec. 6, 1968, claims not given).*

A small, portable dust collector attracts dust by the static electricity it generates. Shaped very much like a pencil, the collector has a tubular casing made of ebonite or similar material that induces static electricity when rubbed. A small electric motor is installed in the rear and a shaft extends from the motor to the tip. The front half of the shaft is wound with silk or hairs in such a way that the latter rub the inner wall of the casing when the shaft revolves. The motor can be operated with self-contained batteries or with alternating current taken directly from AC mains through an AC power cord. When the motor is switched on, the silk or hair unit revolves with the shaft, rubbing the inside of the casing to generate static electricity. For dust adsorption, the tip of the collector is brought close to dust. The device is especially suitable for a precision machinery assembly shop, where dust adhering to parts must be removed with no risk of injury to the parts. In contrast to a conventional vacuum pump cleaner, the collector disperses no dust during collector. Another advantage is that it can be used in a narrow space.

15793 APTIC NO. 33980

Takayama, Y. and K. Sekiguchi

PROBLEMS AND MECHANISM OF RECENT ELECTROSTATIC PRECIPITATORS. *(Saikin no denki shujinki no shomondai to sono kozo). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 7(10):613-616, Oct. 1971.*

Collection of submicron dust is a problem due to its redispersion at the time of rapping and the difficulty of transporting the collected material. A new electrostatic precipitator was developed to control secondary environmental pollution. The collection electrodes have surfaces with unified ion distributions and cause a relatively small rate of redispersion of dusts during rapping. The electrode s complex cross section gives it a high intensity and durability, and the collection efficiency will not decrease with a long period of use. Discharge electrodes have excellent properties such as equal corona spot distribution and a low pressure at the time of corona spark discharge. The electrodes are made of flat steel, and there is no danger of irregular vibration or breakage of the wire. This stability makes it possible to manufacture larger discharge electrodes which withstand higher voltage. The collection rate can be increased several percent without enlarging the collection apparatus itself, if a static separation board is installed immediately behind the electrodes.

15794 APTIC NO. 34209

Tenney, E. D.

PARTICULATE EMISSION COMPLIANCE TODAY AND TOMORROW. *Preprint, National Petroleum Refiners Association, Washington, D. C., 6p., 970. (Presented at the National Petroleum Refiners Association, Western Regional Meeting, Salt Lake City, Utah, Sept. 22-23, 1970, Paper WR-70-64.)*

The reduction of particulate emission from fluid cat cracker regenerator stacks or from fluid coker burner stacks is discussed. Before determining what equipment will be required, it is necessary to consider what limitations will be placed on particulate emissions. At present, laws range from the prohibition of a nuisance to specific limitations on the quantity of material emitted and the stack appearance. The four types of collectors which remove solids from effluent gases are cyclone collectors, electrostatic precipitators, fabric filters, and wet scrubbers. Cyclone collectors can be designed to withstand major temperature upsets which may occur and are the only type of collector which can be designed to operate at regenerator outlet pressure. Maximum efficiencies range between 75-90%. Material escaping from a cyclone collector will result in a greater opacity of the stack plume than the same quantity from other collectors. Electrostatic precipitators have a low pressure drop and minimize design pressure of CO boiler, can withstand limited temperature upsets, and essentially eliminate corrosion; disadvantages include a high resistivity of the regenerator catalyst, making it necessary to add ammonia to gases entering a precipitator, and greater power requirements. Fabric filters have a high efficiency, usually over 99%, a low pressure drop, and require only a small amount of auxiliary electrical power. The fabric filter cannot tolerate any temperature upset and requires a large land area. Wet scrubbers are the only collectors which can be designed not only for high collection efficiency of solid particles, but also for objectionable gaseous components in the flue gas stream. Initial cost is less than an electric precipitator or fabric filter, but it is subject to severe corrosion and erosion.

15795 APTIC NO. 34293

Terlyanskaya, A. T. and L. P. Finogeev

CATALYTIC PURIFICATION OF SPENT GASES FROM THE PRODUCTION OF PAINTS AND VARNISHES. *(Kataliticheskaya ochistka otkhodyashchikh gazov proizvodstva lakokrasochnykh materialov). Text in Russian. Khim. Prom. (Moscow), no. 8:583-584, 1971. 2 refs.*

The results are presented of an experimental investigation of the catalytic purification of waste gases during the production of varnishes and paints, carried out on a copper-chromium catalyst. The waste gases contained acrolein, phthalic anhydride, and xylene. The gases were analyzed before and after catalytic oxidation. Optimum conditions for the catalytic oxidation of waste gases were determined, including velocity, temperature, and amount of gas. The Cu-Cr catalyst can be used in the purification of waste gases from varnish production when the concentration of organic substances is no higher than three mg/l (with respect to xylene).

15796 APTIC NO. 33620

Teworte, W.

ENVIRONMENTAL PROTECTION FROM THE VIEWPOINT OF THE NON-FERROUS METAL INDUSTRY. *(Umweltschutz aus der Sicht der NE-Metallindustrie). Text in German. Z. Erzbergbau Metallhuettenwesen, 24(10):505-506, Oct. 1971. (Presented at the Gemeinsomen analytikertagung, Duesseldorf, Germany, June 3, 1971.)*

The non-ferrous metallurgical industry has solved the problem of sulfur dioxide emission: no sulfide-containing ore is processed without the subsequent production of sulfuric acid. In 1970, the equivalent of 550,000 tons of SO2 went into the sulfuric acid production process. Dust collectors are employed at pyrometallurgical processes. In one method, furnace gases are drawn off to be cleaned and, in another method, the entire air in the workshop is cleaned. Fluorine emissions still present problems, and more research is required here.

15797 APTIC NO. 34087

Thau, A.

EXTRACTION AND UTILIZATION OF FUEL GAS SULFUR. *(Gewinnung und Nutzbarmachung des Brennstoffschwefels). Text in German. VDI (Ver. Deut. Ingr) Z. (Duesseldorf), no. 3:81-86, 1938. 16 refs.*

Gas desulfurization removes three types of bound sulfur: sulfuric acid, ammonium sulfate, or elemental sulfur. The dry process is the oldest desulfurization method. The sulfur is bound to iron hydroxide and is extracted through thermal treatment. Then the sulfur vapors are oxidized to sulfuric acid. In the wet process, ammonia water is used to scrub out the ammonia and sulfur dioxide of coking gases. Other methods for the simultaneous removal of sulfur and ammonia from waste gases have been abandoned. In the Thylox wet process, the gas is scrubbed with arsenic solution. The Petit process uses a potassium carbonate solution as a scrubbing fluid, while the Alkazid process uses an amino acid salt solution. The dry desulfurization process uses burned lime, iron hydroxide, and activated coal. The oldest method binds sulfur to iron hydroxide. Then sulfur iron is formed which, through the influence of oxygen, is converted to iron oxide and sulfur. Two recovery methods are when the iron hydroxide is removed from the cleansing apparatus and spread out until it is sufficiently regenerated and when it is constantly mixed with air is a specific ratio.

15798 APTIC NO. 34108

Thur, George M.

THE FEDERAL GOVERNMENT APPROACH TO DEVELOP AUTOMOTIVE GAS TURBINES. *Preprint 11p., 1971.*

Six kinds of power systems, including gas turbine systems, are being studied in the Advanced Automotive Power Systems (AAPS) Program of the Environmental Protection Agency. The gas turbine program is emphasizing solutions to the most difficult technical problems facing the designer in the hope of stimulating industry to proceed with further development. These problems include the need for reducing nitrogen oxide emissions, fuel consumption at part-load operation, cost of materials, and vehicle acceleration lag. In addition, manufacturing techniques must be developed for producing high-speed machinery. Methods of nitrogen oxide reduction under study are lean primary combustion zones, two-stage combustion (rich primary zone combustion followed immediately by a lean combustion zone), internal recirculation of exhaust products, improved fuel air mixture, rapid cooling of primary zone combustion products, and high primary combustion zone velocities. Aerospace component technology may provide a simple-cycle, single shaft turbine engine with the ability to obtain high compression ratios in a small single-stage compressor. This would simplify engine desing with consequent lower manufacturing cost, while reducing high fuel consumption and vehicle acceleration lag.

15799 APTIC NO. 34164

Topsoe, Haldor Frederik Axel

PROCESS FOR DESULPHURISATION OF INDUSTRIAL GASES. *(Assignee not given.) Brit. Pat. 1,210,863. 5p., Nov. 4, 1970. (Appl. Feb. 9, 1968, 17 claims).*

A method is described for making activated zinc oxide for use as an absorber in desulfurization processes. Shaped bodies of zinc oxide are heated at 300-400 C in an atmosphere that is initially of hydrogen or a mixture of hydrogen and up to 50% steam, while in the second stage an atmosphere free of oxygen and containing at least 50% steam is employed at a temperature of 400 to 550 C. A zinc oxide material activated in accordance with this procedure can have a comparatively high bulk density and thereby a high desulfurization capacity per unit volume, which involves a decrease of the dimensions of the apparatus and thus of the investment costs.

15800 APTIC NO. 33717

Ueda, Shunichi and Toyomasa Ogata

EXHAUST GAS DESULFURIZATION OF ABSORBING TOWER (PRODUCTION OF HYDROGEN SODIUM SULFITE). *(Kyushuto no haigasu shori (Sansei aryusan soda no seizo)ni tsuite). Text in Japanese. Ryusan (J. Sulphuric Acid Assoc., Japan), 24(7):1-5, July 1971. 6 refs.*

A sodium bisulfite manufacturing plant was constructed in August 1971 in Saganoseki, utilizing the sulfur dioxide gas from the absorbent tower of a sulfuric acid plant of the Japan Mining Saganoseki Refinery and caustic soda from Osaka Soda Co. The NaHSO3 production system consists of a deoxygenation tower, two exhaust gas towers, a fan, stacks, a raw gas tower, a deoxygenation pump a diluted sulfuric acid tank, a raw gas pump tank, a product pump tank, two emission gas pump tanks, and an underground pit. It treats 1800 N cu m/min of emission gas, uses 30 N cu m/min of raw gas; it produces 40 t/d of NaHSO3; the emission gas at the exit of the stacks contains 12 ppm of SO2 and 5 ppm of SO3, and absorption rate is more than 99%. Material consisting of 48% caustic soda solution is transported by ship and stored in a 200 kl tank and sent to the 100 kl tank of the treatment plant. The emission gas from the absorption tower of the sulfuric acid factory is sent to the deoxygenation tower by a 160 m gas conduit, where sulfuric acid mist and SO3 are eliminated. Exhaust gas then goes to two exhaust gas towers where SO2 is absorbed in caustic acid and forms NaHSO3.

15801 APTIC NO. 33831

Uejima, C.

FREE MAINTENANCE OF DUST COLLECTORS. *(Fri mentenance no shujin sochi). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 7(10):569-572, Oct. 1971. 1 ref.*

An auto-air filter is made of a specially developed synthetic mesh on which approximately 10 mm long thin nylon hair is electrically planted. The filter is attached by two rollers to the dust collector. A suction nozzle is attached by a flexible hose to a cyclone collector and a suction blower, and the collected dust accumulates in the cyclone bucket. The air resistance of the filter will rise as the dust accumulates on the filter from 12 mm Aq to approximately 13.5 to 14 mm Aq. When the resistance reaches the maximum, an automatic switch will start the cyclone blower and motor, which will clean and recover the filter. The system is completely automated except for emptying the accumulated dust from the bucket. The emptying of the bucket may be automated, if the system is connected with a central vacuum system. The frequency of emptying the bucket in ordinary air conditioning of an office building is once every three to six months. The maintenance cost is extremely low. Approximate costs for installation and maintenance are given by formulas. The space required for installation of an auto-air filter is much smaller than the space needed for a rolled mat type filter.

15802 APTIC NO. 33952

Vacek, A. and A. Schertler

WASTE-GAS CLEANING SYSTEMS AT OXYGEN STEEL PLANTS. *Iron Steel Inst., London, Spec. Rept., no. 61:82-89, 1958. (Presented at the Iron and Steel Institute, Air Pollution Meeting, London, England, Sept. 25-26, 1957.)*

The L. D. oxygen steelmaking process consists of oxygen blown through a tuyere onto the surface of the hot metal in a refractory-lined vessel. Outgoing reaction gases continue to burn in the flue at temperatures up to 3632 F. Current types of gas-cleaning systems, however, will only tolerate a maximum gas temperature of about 392 F. The difficult problem of cooling the waste gases was solved when a fume-cleaning system was combined with a waste-heat boiler system. Preliminary work is described, as well as trials with chemical dust collection, soft water, Theisen disintegrators, Baum venturi scrubbers, and the Waagner Biro wet cleaning system. The latter system, comprises an eddy-type washer with direct and counter gas flow. An electrostatic precipitator is connected to the system. Dry cleaning systems which were tested included slag-wool filters, coke filters, electromagnetic filters, and electrostatic filters. The waste-heat boiler and the Lurgi electrostatic precipitator system are described, as well as processes in use elsewhere.

15803 APTIC NO. 33432

Vilesov, N. G., A. G. Kasatkin, V. M. Lekae, and Yu. P. Kuznetsov

MECHANISM OF CARBON DISULFIDE FORMATION DURING INCOMPLETE REDUCTION OF SO2 BY METHANE. *(Mekhanizm obrazovaniya serougleroda pri nepolnom vosstanovlenii sernistogo angidrida metanom). Text in Russian. Trudy. Mosk. Khim. Technol. Inst., no. 47:86-89, 1964. 11 refs.*

A literature survey is given on reaction of sulfur dioxide with methane at 900-1200 K, in which carbon disulfide is formed along with other products. The presence of CS2 in reaction products was a result of the existence of pseudo-equilibrium in the system SO2-CH4, which depends on slow-down of the CS2 reaction with water (in which hydrogen sulfide carbon dioxide are formed), the slow-down occurring when specific catalysts are used. Of the catalysts studied, lead compounds were most effective. A CS2 yield higher than 50% was obtained only as a result of accummulation of elementary carbon on the on the catalyst surface followed by a direct synthesis of CS2 from elements. The rapid increase or decrease of the volume velocity of reagents has an unfavorable effect on CS2 yield. Further thermodynamic and kinetic studies are needed for the industrial application of the process.

15804 APTIC NO. 33726

Vincent, J. H.

ELECTROSTATIC PRECIPITATION OF AIRBORNE DUST IN THE WAKE OF A PERFORATED PLATE. *J. Appl. Phys., 4(10):1499-1512, Oct. 1971. 16 refs.*

An experimental investigation was conducted to determine the mechanisms by which electrically charged dust particles are collected electrostatically in the wake of grounded perforated plates placed at right angles to an airstream moving at about 180 cm/sec. The electric field was applied by means of a second perforated plate placed just downstream of the first and at high negative potential. Dust passing through the first of these two grids was collected on the downstream face of the first grid as a result of the electric forces acting on the particles in the direction opposing the gas flow. A theoretical model for the collection mechanism describes how this is greatly assisted by the formation of eddy pockets in the wake of the first grid, and by the entrainment of dust particles into these eddies. Using industrial fly-ash samples, experimental measurements of collection efficiency as functions of applied grid voltage and dimensionless grid aspect ratio indicate that the theoretical model is basically correct. (Author abstract)

15805 APTIC NO. 33727

Vincent, J. H.

ELECTROSTATIC PRECIPITATION OF AIRBORNE CHARGED DUST PARTICLES TRAPPED IN STATIONARY OR QUASI-STATIONARY VORTICES. *Atmos. Environ., 5(9):791-799, 1971. 11 refs.*

The effect of vortex-enhanced electrostatic precipitation of charged particles trapped in the wakes of shielding slats may produce significant gains in the basic collection efficiency of a conventional duct-type precipitator. Nevertheless, the major contribution to overall collection efficiency is probably still that arising out of the reduction in losses by reentrainment. It will be difficult to detect the new effect in practice, since it will nearly always be dominated by the effects of reduced reentrainment. One possible solution may be to examine the application of shielded electrodes in the case where the collecting electrodes are continuously irrigated, and where reentrainment is at a minimum. (Author conclusions modified)

15806 APTIC NO. 34207

Viswanathan, T. S. and S. Visvanathan

RECOVERY OF SULPHUR FROM COKE OVEN GAS: A CRITICAL REVIEW OF METHODS. *Tisco (Jamshedpur), 15(3):104-110, July 1968. 27 refs.*

Coke oven managers have long been aware of the anomaly that while they have to buy sulfur to make the acid to fix the ammonia in coke oven gas, they must also incur considerable expense and trouble eliminate the sulfur to meet consumer requirements. Dry processes for the removal of sulfur include an oxide purification system, the Katasulf process, and a fluidized bed process; wet processes include the Seaboard process, vacuum carbonate or hot actification process, Alkazid process, Thylox process, Giammarco-Vetrocoke process, and iron suspension process, the Collin process, Tata-Collins process, and the Stretford process. A review of the various established methods for the removal and recovery of sulfur from coke oven gas and their possible applicability to the Tata Iron and Steel Works shows that the Thylox process, which yields elementary sulfur, or the vacuum carbonate and the Collin process, which furnish the sulfur as hydrogen sulfide, offer economic possibilities.

15807 APTIC NO. 34034

Wade, D. T.

FUEL VOLATILITY AND AUTOMOTIVE EMISSIONS. *American Petroleum Inst., New York, Div. of Refining, Proc. Am. Petrol. Inst., Div. Refining, vol. 51:944-950, 1971. (Presented at the Midyear Meeting, 36th, San Francisco, Calif., May 12-14, 1971.)*

Reduced fuel volatility might be required in some local areas even though it appears to offer marginal value from an air quality viewpoint. The alternative labelled Pre-1970 Cars are directed toward reducing evaporative emissions from cars without evaporative loss control devices, i.e., pre-1970 cars in California and pre-1971 cars nationwide. The proposed change is to reduce front-end volatility as illustrated by the reduction in Reid Vapor Pressure and the percent distilled at 160 F. The alternative labelled Post 1975 cars are directed toward improving startup and warmup characteristics of cars which have to meet the very restrictive 1975/76 carbon monoxide and hydrocarbon standards. The proposed change would substantially increase mid-fill and back-end volatility as illustrated by the increase in percent distilled at 210 and 302 F. Both of these alternatives would require substantial changes in refinery processing and thereby increase the cost of fuel. As might be expected there are hardware solutions available which can serve as alternatives to both of these proposed fuel changes.

15808 APTIC NO. 34220

Waid, Donald E.

AIR POLLUTION CONTROL THROUGH THERMAL INCINERATION OF ORGANIC FINISHING FUMES. *Ind. Finishing (Indianapolis), 46(6):32-36, June 1970.*

Most installations for air pollution control in industrial finishing plants during the last few years, and all known installations under Rule 66 in Los Angeles County and Regulation 3 in the San Francisco Bay area, have been of the direct gas flame thermal incineration type. Operation of fume incineration equipment is discussed. Some of the advantages of the thermal process over other means of organic solvent control include its adaptability to future code changes and its stable performance from the time of installation. There are no additional materials or parts such as catalysts or charcoal to clean, reclaim or maintain, and in many cases oxygen from the effluent is utilized for combustion. The direct gas-fired thermal incinerator can readily be worked into a paint bake oven or other process heat equipment. Methods of heat recovery and field test reports are discussed.

15809 APTIC NO. 33676

Wakabayashi, Katsuhiko and Yoshio Orito

HYDRODESULFURIZATION OF THIOPHENE OVER NI-MO-Al2O3 CATALYSTS. *(Nikkeru-moribuden arumina kei shokubai ni yoru chiofen no suisoka datsuryu). Text in Japanese. Kogyo Kagaku Zasshi (J. Chem. Soc. Japan), 74(10):2203-2204, 1971. 7 refs.*

Experiments were conducted to examine the relationship between nickel-molybdenum atomic ration and hydrodesulfurization activation of thiophene. Activity of catalysts containing both Ni and Mo was greater than that of catalysts containing only one element. Most active catalysts were those containing a three/two ratio of Ni and Mo, but the range from one/three to three/one showed considerable activity. In cobalt-molybdenum-alumina catalysts, those with Co-Mo content with a greater Mo ratio were the most active. Among Ni-Mo-Al2O3 catalysts, those with greater Ni content showed the greatest activity. When comparing catalysts with the same atomic ratios, those containing Ni rather than Co showed a greater activity. Ni catalysts produced more butane in reacting to thiophene than Co catalysts. In observing butane selection rate, it was suggested that some butane was produced from processes other than successive hydrogenation, for instance, through butyl mercaptan or through butadiene without forming butene.

15810 APTIC NO. 33515

Walter, E.

INVESTIGATIONS ON THE FLOW PATTERN IN CYCLONES. *(Untersuchungen ueber den Stroemungsverkauf in Zyklonen). Staub (Duesseldorf), 16(46):466-480, 1956. 3 refs. Translated from German by W. H. Everhardy, National Institutes of Health, Bethesda, Md., Translating Unit, 21p., July 30, 1958.*

Experimental results and flow investigations on cyclones used to remove dust or aerosols with the same construction of the intake part but with separating chambers of different shapes were compared. A conically-widened separating chamber has advantages in removal efficiency and resistance to flow over a cylindrical or conically-tapered chamber. The energies required for the separation of air and solid particles seem to be exhausted completely in the intake part, while the shape of the separating chamber attached to it chiefly, if not exclusively, determines the conversion of energy and flow pattern. (Author summary modified)

15811 APTIC NO. 33732

Walther, James E. and Herman R. Amberg

THE ROLE OF THE DIRECT CONTACT EVAPORATOR IN CONTROLLING KRAFT RECOVERY FURNACE EMISSIONS. *Pulp Paper Mag. Can. (Quebec), 72(10):65-67, Oct. 1971. 10 refs. (Presented at the Canadian Pulp and Paper Association, Technical Section, Annual Meeting, 57th, Montreal, Quebec, Jan. 26-29, 1971, Paper T305.)*

A study was made of total reduced sulfur and sulfur dioxide emissions from several conventional kraft recovery furnaces using direct contact evaporation and a newer designed furnace without a direct contact evaporator. Sulfur emissions were measured with Barton sulfur titrators. The direct contact evaporator did not emit total reduced sulfur when the black liquor sodium monosulfide content was less than 0.5 g/l and the pH was 12 or higher. Although average recovery furnace total reduced sulfur emissions were less than 5 ppm, average SO2 concentrations ranged from 150 to 680 ppm. The direct contact evaporator removed about 75% of the SO2 emission and up to 50% of the furnace total reduced sulfur emission, when total reduced sulfur concentration exceeded 5 ppm. (Author abstract modified)

15812 APTIC NO. 34176

Warnock, J. G. and J. A. M. Wilson

TIDAL POWER: THE RELENTLESS, CLEAN AND PREDICTABLE ENERGY SOURCE. *Preprint, American Inst. of Chemical Engineers, New York, 23p., 1971. 4 refs. (Presented at the American Institute of Chemical Engineers, National Meeting, 68th, Houston, Tex., Feb. 28-March 4, 1971.)*

Tidal power generates energy from the regular and successive ebb and flow of the ocean. In certain specific locations, coastline configurations lead to a condition of resonance which creates a substantial increase in tidal ranges over those occurring in the open ocean. At these locations tidal power is sufficiently concentrated that substantial amounts of energy can be recovered by ingeniously designed generating plants. With the growing concern over environmental effects of power production facilities and with the depletion of nonrenewable energy reserves, the alternative of this relentless, clean, predictable source of energy becomes highly attractive. The simplest method of utilizing tidal energy is by building a barrage through which tidal water can flow into a basin. The barrage includes sluice gates and generating units. Water is allowed to enter the basin freely through the sluice gates on the rising tide. The gates are then closed and the lowering water created by the ebb of the tide outside the basin creates a head of water. The basin is then emptied through the turbines which drive generators and produce electric power. The turbines can work in reverse as pumps during the filling cycle. (Author abstract modified)

15813 APTIC NO. 33393

Watanabe, Shoji

ABATEMENT METHODS FOR COMBUSTION PRODUCTS. *(Shosho seiseibutsu no teigen taisaku ni tsuite). Text in Japanese. Nenryo Oyobi Nensyo (Fuel and Combustion), 38(10):1-8, Oct. 1971. 5 refs.*

When the ratio of the air in the air-fuel mixture is gradually decreased, carbon monoxide and hydrocarbons in the exhaust gas will decrease gradually. Nitrogen oxides increase until about a 16 to one ratio, and then begin to decrease. Therefore, the first step in abatement of exhaust gas is a rigorous control of suction air ratio. The methods presently used are CAP apparatus (Chrysler), double heating manifold (Volvo), and electronic control fuel injection (Volkswagen). If the air is blown in when exhaust gas leaves the engine combustion chamber, CO and HC can be completely burned, but this does not eliminate NOx. Oxidation of CO and HC by catalysts has been effectively practiced, and recently, a discovery of catalysts for reducing NOx by CO into CO2 and N2 has been reported. Effective use of these catalysts may bring a solution. In Japan, where industrial areas and cities are close and continuous, the control of NOx emitted by boilers is more urgent than automobile exhaust NOx control. The control of thermal electric power plants, which can emit NOx equal to the amount emitted by several hundred thousand cars is an absolute necessity. The amount of NOx is influenced by the method of combustion rather than by the kind of fuel. Lowering sulfur content in fuels has been emphasized greatly, but the problem cannot be solved by this effort alone.

15814 APTIC NO. 33669

Watari, Shinjiro

STUDIES AND INDUSTRIALIZATION OF SPHERICAL ACTIVATED CARBONS. *(Kyukei kasseitan no kenkyu to kogyoka). Text in Japanese. Preprint, Ministry of International Trade and Industry, Tokyo (Japan), Public Nuisance Resources Research Inst., p. 31-35. (Presented at the Public Nuisance Resources Research Institute Research Seminar, Tokyo, Japan, Oct. 6, 1971.)*

Crushed bituminous coal particles of approximately -200 mesh are mixed with water and viscous material such as pulp waste liquid, kneaded and formed into balls either at a normal temperature or at 400 C. Those balls shaped at a normal temperature are heated for 10-15 min at 300 C, and reheated for 30 min at 500-600 C and carbonized. All carbon balls are activated in 800-900 C steam for 10 to 20 hrs. By this method, some 30-40% of the material coal can be formed into activated carbon. Studies revealed that the pore size and pore distribution influence the adsorption capacity greatly and the internal ratio to the surface area had little influence on adsorption. Activated carbons used for desulfurization of exhaust gas can be washed by water and recovered by reheating. In 1970, the continuous manufacturing of activated carbon at the rate of 20 kg/hr became possible.

15815 APTIC NO. 33827

Wolf, Ralph R.

RUBBER USE IN 1972 AUTOS. *Rubber Age (New York), 103(10):69-76, Oct. 1971. 6 refs.*

Changes in the rubber parts on the 1972 model cars now coming on the market are for the most part changes in degree only. The non-tire uses of rubber in the automobile are considered. Fuel evaporative emission control systems require several new elastometric parts – seals for the vacuum/pressure valve in the fuel tank cap, gaskets for the canister, tubing, and a purge hose to carry the vapor from the canister to the air cleaner and carburetor. A typical example of a non-tire application where higher under hood temperatures may eliminate a long used material is the natural rubber motor mount. Tuning is thrown off when temperature changes because butyl s spring rate and damping both skyrocket as the temperature drops. The epichlorohydrin rubbers, Herclor and Hydrin, are two candidates to fill this need for less temperature sensitivity in an elastomer with greater heat resistance than that of natural rubber. Wiring and oil seal problems, windshield wiper blades, effect of fuel changes, bumper changes, and air bags are also discussed.

15816 APTIC NO. 33353

Wollaston, E. G., W. L. Forsythe, and I. A. Vasalos

SULFUR DISTRIBUTION IN FCU PRODUCTS. *Proc. Am. Petrol. Inst., Div. Refining, vol. 51-12-5, 1971. 7 refs. (Presented at the American Petroleum Institute, Division of Refining, Midyear Meeting, 36th, San Francisco, Calif., May 12-14, 1971.)*

In catalytic cracking, the desulfurization which accompanies cracking removes about half the feed sulfur as hydrogen sulfide. The exact distribution of this and the remaining sulfur depends upon the processing conditions and type of sulfur compounds in the feed. The non-thiophenic portion of the feed sulfur readily cracks at low conversion to form hydrogen sulfude; the remaining thiophenic sulfur compounds crack by a slower, rate-limiting process controlled primarily by space velocity. The sulfur distribution in liquid products is closely related to the distribution, by ring number, of thiophenic compounds in the feed: one-ring compounds ending up in gasoline, two-ring compounds in light cycle oil, and three and four-ring compounds in heavy cycle and decanted oils. The sulfur in coke depends upon the sulfur content of the feed. Certain feed types and/or recycle of high end point cycle oils can increase or decrease the relative level of sulfur in fluid cracking unit (FCU) coke by 25-50%. (Author abstract)

15817 APTIC NO. 33437

Wright, J. H.

THE ROLE OF ELECTRIC POWER IN MINIMIZING TOTAL POLLUTION FROM ENERGY USE. *Preprint, 11p., 1971. 11 refs. Illinois Inst. of Tech., Chicago, Technical Center. (Presented at the American Power Conference, Chicago, Ill., April 20-22, 1971.)*

While considerable progress has been made in reducing air pollutants from energy use, particularly from fossil-fueled power plants, it is clear that much additional effort must be applied just to prevent matters from becoming worse as more energy is consumed by our society. The systems planning of energy use patterns is suggested as a practical method of improving environmental quality, particularly in the urban centers. Increasing electric power as a primary energy converter by a factor of three over present patterns should cut pollutant emissions nationally by more than 50% and in the urban center by as much as a factor of three or four. Only with this energy pattern can nuclear power play a really significant role in improving environmental quality. The added use of electricity, as well as the use of discharge heat from power production in space heating and certain process industries, should provide an annual savings of 10 to 15% in this nation s total energy requirements. The pollutants common to energy production include nitrogen oxides, hydrocarbons, particulates, sulfur oxides and carbon monoxide. Air pollution control in power generation is mentioned. Transportation, process heat, space heating, and electrical substitution in future energy patterns are considered. (Author conclusions modified)

15818 APTIC NO. 33768

Yamada, Mamoru

EQUIPMENT TO PROCESS HIGH POLYMER WASTES. *(Gosei kobunshi kei haikibutsu shori setsubi). Text in Japanese. Preprint, Reutilization of Resources Technical Assoc. (Japan), 20p., 1971. (Presented at the Seminar on Reutilization of Resources Technology, 2nd, July 12-14, 1971.)*

A heat-bath carbonization system for mixed plastic wastes likely to generate a large amount of hydrogen chloride is described. The system takes advantage of the fact that polyvinyl chloride breaks down at comparatively low temperatures. Melted plastic wastes provide the heat for carbonization. Consequently, there is no secondary pollution and equipment and operating costs are drastically reduced. The equipment consists of carbonization, gas recovery, and by-product recovery devices and an incinerator. About 98% of the chloride in PVC is eliminated and the gas generated is only 1/20 that from an incinerator system. Two absorbers recover 99.9% of the HCL gas as hydrochloric acid; the remainder is completely neutralized with alkali in the washing tower. The acid (30% concentration) can be refined into pure hydrochloric acid. After being separated from the hydrochloric acid, the C-C gas (?) can be distilled to obtain benzene, toluene, and hexane. Carbonization residues are burned in the incinerator. One is carbon powder with PE adhering; the second is hydrocarbon gas; and the third is a mixed solution of benzene, etc. Since they are changed into forms easy to burn, no black smoke is generated. The heat generated is utilized for the carbonization process. Unlike incinerators, the carbonization equipment resembles a chemical plant.

15819 APTIC NO. 34072

Yamada, Masatoshi

FLK PROCESS–WASTES MELTING KILN. *(FLK puroseu – Haikibutsu yoyuro). Text in Japanese. Preprint, Reutilization of Resources Technical Assoc. (Japan), 8p., 1971. (Presented at the Seminar on Reutilization of Resources Technology, 2nd, July 12-14, 1971.)*

An incineration system is described which has a 1000 kg/hr capacity and generates 1000-4000 kcal/kg. It is cylindrical in shape and made of steel sheet fixed on an iron frame. It is about eight m high with a maximum diameter of three m. Wastes are placed in the top part of the incinerator and are passed through two charging gates which are both closed after the wastes pass through. Thus, excess air is restricted in the German developed FLK process. A rotating feeder shakes up the wastes and evenly transports them to a ring-shaped drying chamber. The dried wastes are sent to the incinerator chamber to remove their odors, and then pushed on to a flame chamber with an ignition burner. Non-inflammables melt to form a melted film and flammables become gases at temperatures from 1400-1500 C. The burner stops when the temperatures rise to 1500-1800 kcal/kg and the wastes burn by themselves. The melted matter is water cooled and recovered as slug; the gas is lead to a post-incinceration chamber and completely burned.

15820 APTIC NO. 33738

Yamada, T., S. Sakabe, M. Kawai, S. Hirasawa, K. Miyajima, and M. Oya

STUDIES ON NO2 CONTROL TECHNIQUE OF STABILIZED COMBUSTION SYSTEM. *(Kotei nensho sochi kara no NO2 boshi gijutsu ni kansuru kenkyu). Text in Japanese. Preprint, the Japan Society of Chemical Engineers, Tokyo, p. 75-76, 1971. 3 refs. (Presented at the Japan Society of Chemical Engineers, Autumn Conference, 5th, Osaka, Japan, Oct. 1971.)*

Influences of oxygen partial pressure, combustion temperature, boiler load, and amount of nitrogen in fuel on the nitrogen oxide emission volume, were examined. A continuous infrared gas analyzer, and the naphtyl ethylenediamine method of gas analysis were used to measure NOx, and a magnetic oxygen meter was used to measure 02. The nitrogen dioxide was sampled by the wet method when gas analyzer index figure and temperature were stabilized. The NOx content and the combustion temperature formed a proportionate relationship, NOx content between 1550-1850 K temperature was 250-390 ppm. The NOx concentration seemed to decrease when the partial pressure was increased, because the combustion temperature dropped; but under a stabilized temperature, NOx concentration tended to increase when 02 partial pressure was increased. When the boiler load was reduced by half, combustion was irregular and fluctuation in NOx measurements occurred. But when the lead was three times larger, NOx content tended to increase. When the N content ratio was increased in the fuel, NOx in emission gas tended to increase; however, the ratio was not proportionate. It was concluded that the NOx content in emission gas was largely influenced by the temperature factors.

15821 APTIC NO. 34070

Yamaguchi, Ryoji and Hirohisa Okudaira

METALLIC FILTERING MATERIAL FOR AIR FILTERS. *(Eya firuta-yo kinzokusei rokazai). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 46-25985. 2p., Sept. 7, 1971. (Appl. Dec. 9, 1968, claims not given).*

Thin copper, aluminum or other metal wires with spiral cross sections are made into spirals and formed into a complex of mesh, either in a bamboo screen form or a lattice form. This mesh used on appropriate frames will cause air to collide into filtering surfaces and, by creating irregular, turbulent flow, make the polluted air go through all possible passages, making the filtering action most effective.

15822 APTIC NO. 33787

Yankovsky, S. S. and N. G. Bulgakova

THE GRAPHICAL METHOD OF DETERMINATION OF THE FRACTIONAL EFFECTIVENESS OF CYCLONES AND THE DISPERSENESS OF DUST. *(Graficheskiy metod opredeleniya effektivnosti tsiklonov i dispersnoti pyli). Text in Russian. Teor osn Khim. Tekhnol., 5(4):615-616, 1971. 3 refs.*

The assumption of a normal logarithmic law for both dust particle size distribution and partial cyclone efficiencies is suggested in order to find a simplified solution for these two problems. Then the degree of dust dispersion can be characterized by an average geometric dust particle diameter dp and by a standard deviation sigma P. The curve for partial efficiences can be expressed by the particle diameters d ts at which the efficiency of dust trapping constitutes 50% and by the standard deviation sigma ts. Based on these assumptions an equation had been developed in a previous work which could be used for the computation of an alignment chart that would allow a graphic solution for the two above stated problems. Two examples are given.

15823 APTIC NO. 33401

Yokoi, Masao

EXHAUST GAS DESULFURIZATION IN IRON MANUFACTURER. *(Kotetsugyo ni okeru haien datsuryu). Text in Japanese. Ryusan (J. Sulphuric Acid Assoc., Japan), 24(5):11-19, May 1971.*

The absorption of sintering exhaust gas was studied at the Kanagawa Prefectural Industrial Test Station. The gas absorption apparatus was designed to capacitate 3000 N cu m/hr. Exhaust gas from a sintering plant was taken through a flue and led to a dust collector. After dust particulates were trapped by a small amount of water, humidity was eliminated by an ordinary mist separator. The fan sucked in the gas and sent it to the absorption tower. The absorbent was either ordinary industrial water or ammonia water produced by a coke furnace. When using industrial water, the water temperature was high at 34 C; although solubility of SO2 was small, as much as 90-95% was absorbed. When using ammonia water, regardless of the conditions, the desulfurization rate was extremely good, achieving 98% or more at all times. Industrial water was 60 t/hr; temperature, 33-35 C; pH, 7.2-7.4; ammonia water, 30 t/hr; temperature, 36-41 C; pH 8.4-8.6; and the concentration of SO2 at the entrance, 1,400-2,000 ppm. An intermediary size test system was constructed in the Oshima area for Japan Kokan (Steel Pipe) Co., and desulfurization tests were carried out between January and December 1969. A long run operation was started this year in order to test the endurance and deterioration of the material. The SO2 concentration at the absorption emission exit is 40 80 ppm at all times, testifying to the efficiency of the apparatus. The capacity of the apparatus is 30,000 N cu m/hr gas treatment; size, 4.6 by 4.6 by 12.0 mH; gas blower capacity, 50,000 N cu m/hr; the capacity of the ammonia and sea water circulation tanks, 23 cu m each; ammonia water circulation pump capacity, 200 cu m/hr, and the capacity of the sea water circulation pump, 150 cu m/hr.

15824 APTIC NO. 33769

Yoshimochi, Toshitaro

ON INCINERATION OF PLASTICS. *(Purasuchikku no syokyaku ni tsuite). Text in Japanese. Preprint, Reutilization of Resources Technical Assoc. (Japan), 10p., 1971. (Presented at the Seminar on Reutilization of Resources Technology, 2nd, July 12-14, 1971.)*

Mitsubishi is developing the technology of plastics incineration and total reutilization of wastes. Patents have been requested for a small-volume incinerator without metal fire grids (MGF) and for a kiln-type incinerator with fire grids (MFK). Wastes passed to the rotary kiln become gaseous and carbides become ash on the grids. Inflammable gas from the kiln is completely burned in a secondary combustion chamber prior to discharge through an exhaust-gas disposal device that differs fro the type of waste handled. The incinerator burns not only plastics, but also metals, garbage, and waste oils at the same time. Only a few operators are required to manage the largely automated process. Because the waste to be burned is shaken and stirred, effective incineration is possible. Disposal of dust and exhaust gas is easy since incineration is continuous. Continuous and automated removal of residue is possible. With proper operation and with control of gas temperature in the secondary combustion chamber, dust volume at the outlet of the incinerator can be kept to about 0.1 g/N cu m.

15825 APTIC NO. 33438

Zdenek, Zdenko

PURIFICATION OF CONVERTOR FLUE GASES IN AN OXYGEN STEEL WORKS OF EAST SLOVAKIAN IRON WORKS IN KOSICE. *(Cisteni konvertorovych spalin v kyslikove ocelarne VSZ Kosice). Text in Czech. Hutnik (Prague), no. 8:373-375, 1968. 8 refs.*

The purification of dust from convertor gases is described which is based on combustion of convertor gases and cooling of flue gases followed by the purification of dust in two stages. Detailed description of the design of the gas purification equipment is given and technical data are presented. The two-stage purification of dust consists of a dust chamber or stabilizer, where larger particles are separated, and of an electrofilter for fine particle purification. The properties of the collected convertor dust were analyzed. Both chemical and granulometric composition varied depending on where the sample was collected. The average composition of the dust was 65-75% ferric oxide, 15-19% ferrous oxide, 1.2-2.2% manganese oxide, and five to six percent calcium oxide. Magnetic components formed 89-94%. Average granulometric composition of the dust was determined. The fraction 0.01-0.04 mm was the largest (38%). About 10-12 kg dust is formed per ton of steel. The problem of its liquidation has not been satisfactorily solved so far. Possibilities of dust processing into brickets or its recycling into a convertor are mentioned.

15826 APTIC NO. 33525

Zebrowski, S. P.

INFLUENCE OF AIR MOISTURE CONTENT AND TEMPERATURE UPON THE NATURE OF THE DISCHARGE IN ELECTROSTATIC FILTERS. *(Einfluss der Feuchtigkeit und der Temperatur der Luft auf die Charakteristik der Entladung im Elektrofilter). Physik. Z., vol 33:727-729, 1932. 4 refs. Translated from German. Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio, 9p., June 1957.*

Test apparatus was built to determine the quantitative relationship between current, moisture content, temperature, and rate of flow of the air through the electrostatic filter. The layout was designed to facilitate working with dustfree air. All the components were covered with thermal insulation and equipped with a winding for electric heating, in order to prevent condensation of water vapor on the walls at high humidity. The electric current passing through the electrostatic filter was plotted as a function of gas velocity. The current remained practically unchanged for velocities ranging from 30-145 l/min. The electric current varied with temperature at constant voltage. The higher the temperature and the voltage employed, the steeper the curve. The current decreased with humidity at all test voltages. The curves for water vapor were lower for all voltages than the curves for air.

MEASUREMENT METHODS

15827 APTIC NO. 33445

APPARATUS FOR DETECTING THE PRESENCE OF A GAS. *(Appareil de detection de la presence d un gaz). Text in French. (Compagnie de Construction Mecanique Procedes Sulzer, Paris (France)) French Pat. 1,556,303. 3p., Dec. 30, 1968. (Appl. Dec. 13, 1967, 3 claims).*

An apparatus was designed to detect and signal the presence of certain gases in the air. The device consists of a motor driven band of a material whose color and other characteristics change as a function of the pH of the atmosphere and thus of the content of a determined gas in the air. The band moves at a constant speed, and passes under a photo-electric cell. The latter is exposed to light rays which are focused on the moving band by an optical system and are reflected from the band in the direction of the photocell. The cell is connected via an amplifier to a signalling device which includes an audible alarm and a signal light. For detecting the presence of ammonia in the air, the coloring of the band varies from yellow to dark brown when the pH range extends from 6.5 to 9.5. A bright orange coloring of the band corresponds to a pH of 7.5 which indicates an ammonia concentration of 1.0%; brown color corresponds to a pH of 8.5 which signifies a content of 2.0% ammonia in the air. The control of the response of the photocell to the coloring of the band is effected by an optical filter mounted in front of the cell. With a suitable choice of filter, the cell will respond to a certain coloring, corresponding to a certain gas content.

15828 APTIC NO. 33764

Bureau of Mines, Bartlesville, Okla., Fuels Combustion Research Projects

OXYGENATES IN AUTOMOTIVE EXHAUST GAS: PART III. CARBONYLS AND NONCARBONYLS IN EXHAUSTS FROM SIMPLE HYDROCARBON FUELS. (FINAL REPORT). *Coordinating Research Council, Inc. Contract CRC-APRAC- CAPE-11-68, 16p., 1970. 6 refs.*

NTIS: PB 200884

Studies were undertaken to estimate relative levels of carbonyl and noncarbonyl oxygenates in automotive exhaust gas from simple hydrocarbon fuels. Procedures involved concentration of the exhaust organics followed by a two-state chromatographic separation of the resultant mixture of oxygenates and hydrocarbons. Separated oxygenates were identified using mass spectrometry and/or gas chromatography retention times. Identified oxygenates in exhausts from nine test fuels included saturated and unsaturated aldehydes, ketones, and alcohols, as well as ethers, esters, and nitroalkanes; analytical data on organic acids were inconclusive. Of the identified noncarbonyl oxygenates, phenols and nitromethane were relatively the most abundant. Procedures were also developed for detailed analysis of gasoline exhaust carbonyls through intermediate conversion to carbonyl-oxime derivatives. (Author summary modified)

15829 APTIC NO. 33767

Bureau of Mines, Bartlesville, Okla., Fuels Combustion Research Projects

PROCEDURES FOR DETERMINING EXHAUST CARBONYLS AS 2, 4-DINITROPHENYLHYDRAZONES, PARTS I AND II. (FINAL REPORT). *Coordinating Research Council Proj. APRAC-CAPE 11-68, 40p., April 1969. 11 refs.*

NTIS: PB 200833

Procedures were developed for detailed analysis of exhaust carbonyl compounds by the chromatographic variation of the 2,4-dinitrophenyl-hydrazone method (GC-DNPH). Investigations of procedures for quantitative recovery of hydrazone derivatives from DNPH reagent solution showed that best results are obtained when precipitated hydrozones are recovered by filtration and precipitated on hydrazones by extraction with pentane. The GC-DNPH method (as developed) was compared with the COL-DNPH (Colorimetry) and Gr-DNPH (gravimetric) methods by parallel application to exhaust samples. Results by the COL-DNPH and GC-DNPH methods were in good agreement; results by the Gr-DNPH method were considerably higher and presumably erroneous. The GC-DNPH method is judged overall to be the most desirable of the currently available methods for detailed analysis of exhaust carbonyls. All the DNPH methods may be affected by nitrogen dioxide present in the exhaust sample and carbonyl contaminants present in ambient air. (Author summary modified)

15830 APTIC NO. 33901

British Standards Inst., London (England)

RECOMMENDATIONS FOR THE SELECTION OF APPARATUS AND TECHNIQUES FOR THE ANALYSIS OF GASES BY GAS CHROMATOGRAPHY. *Brit. Standard, no. 4587, 45p., 1970. 29 refs.*

Recommendations for the choice of components and operating techniques were given for a gas chromatograph, and sources of error inherent in component parts were pointed out. Basically the gas chromatography assembly comprises an injection mechanism, a column for separating components, and devices for detection and measurement. The carrier gases commonly used are helium, hydrogen, argon, and nitrogen. The best method of sample injection is to isolate the gaseous sample in a calibrated volume at a known temperature and pressure and then to divert the carrier to sweep the sample from the calibrated volume. Two main types of columns may be used: adsorption columns containing an active solid or partition columns containing a solid support coated with a liquid phase. Factors affecting column performance are column geometry, the carrier gas, the solid support, the liquid phase, active solids, and temperature of the column. Detectors are of two main types: concentration sensitive and mass sensitive. Various types and sources of error were described. Calibration equipment and techniques were also discussed.

15831 APTIC NO. 33920

British Standards Inst., London (England)

METHODS FOR THE MEASUREMENT OF AIR POLLUTION. PART 4. THE LEAD DIOXIDE METHOD. *Brit. Standard, No. '747, pt. 4, 16p., 1969.*

Requirements of the construction, installation, and use of apparatus are described for the determination of atmospheric sulfur compounds by the extent of their absorption by a solid reactive surface during a chosen period of exposure. The method, originally known as the lead peroxide method, employs lead dioxide on an inert cylindrical support; the lead sulfate produced is determined by chemical analysis. Apparatus includes a louvred box, a wooden post, porcelain cyclinders, tapestry cloth, and strong airtight cases. The analytical procedure consists of measuring the length and diameter of the exposed surface at three different positions on the cylinder to calculate the area. The coated fabric is placed in a beaker of water and washed to make a volume of 100 ml. Five g of anhydrous sodium carbonate are added and allowed to stand for three hours. The solution is then boiled for three hours and water is added to keep the volume constant. The solution is filtered and two to three drops of methyl red indicator added. Hydrochloric acid is added until the color just changes to red. Two ml more of hydrochloric acid are added and enough water to achieve a volume of 300 ml. The solution is heated to boiling point and 10 ml of barium chloride solution is added. The solution is allowed to stand overnight, then filtered and washed with hot water. The wet filter paper is incinerated at 800 C and cooled. Two drops of sulfuric acid are added, the paper again heated to 800 C, cooled, and weighed.

15832 APTIC NO. 34046

Japan Petroleum Inst., Sulfur Content Measurement Special Committee

COMPARISON OF METHODS FOR DETERMINING SULFUR CONTENT IN FUEL OIL. *(Nenryo yu ioubun no shogoushiken). Text in Japanese. Sekiyu Gakkai-shi (J. Japan Petroleum Inst., Tokyo), 14(10):802-807, Oct. 1971. 12 refs.*

Sevefal methods for determining the sulfur content in fuel oil using newly-developed devices were compared to the air method of the Japan Industrial Standard to evaluate the reliability of each method. The high temperature method using a resistor furnace and a high frequency furnace was examined. Sulfur dioxide gas generated during incineration of the sample is dissolved in a potassium iodide-starch solution and then is titrated by a standard liquid of potassium iodate. The radioisotope method uses a sulfur meter. The sulfur in the sample is measured by absorption of gamma rays or X-rays from the radioisotope. In electric titration, the amount of sulfur contained in a sample is measured by the electricity consumed during the electrolysis of sulfuric acid formed in hydrogen peroxide solution from sulfur dioxide and sulfur trioxide generated during incineration of the sample. Accuracy of some methods was inferior to that of the air method, but statistically the results were all reliable. The average amounts of sulfur detected by these methods were not very different from the result by the air method, although the high temperature method using a high frequency furnace tended to show a lower sulfur content.

15833 APTIC NO. 33517

Aleksandrov, N. N.

POSSIBILITIES OF AN ASPIRATION METHOD OF MEASURING ATMOSPHERIC RADIOACTIVITY. *Tr. Gl. Geofiz. Observ. (Leningrad), no. 138:42-55, 1963. 9 refs. Translated from Russian in: Soviet Investigations of Atmospheric Pollution, p. 51-68, Nov. 9, 1964. Joint Publications Research Service, Washington, D. C.*

NTIS: JPRS 27-279

A filter-ventilation installation, methods of measuring and computing the concentration of activity in the air, and the results of the measurements were described. The effectiveness of the aspiration method depends on the geometrical and physical characteristics of the filters that are used, the rate of filtration, and the overall volume of the filtered air. A filtration-ventilation installation was assembled for the purpose of evaluating the possibilities of the aspiration method. A filtration-ventilation installation with a productivity of 4.5-9.0 cu m/hr with recommended specific rates of filtration of 7.5-10 l/min sq cm with time for fathering the sample and about 100 min for the measurement of the filter and the background would permit the determination of the concentrations of long-life activity on the order of 10 to the minus 16th curies/l with the aid of end window counters. An installation of this type is suitable for the measurement of an aerosol concentration of 10 to the 15th curies/l and higher with a sampling time of 36 hr and for measuring time of the filter and background of 140 and 90 min corresponding with a statistical error of five percent.

15834 APTIC NO. 33855

Altshuller, Aubrey Paul

ANALYSIS OF ORGANIC GASEOUS POLLUTANTS. *In: Air Pollution. Arthur C. Stern (ed.), Vol 2, 2nd ed., New York, Academic Press, 1968, Chapt. 18, p. 115-145. 156 refs.*

The need for total hydrocarbon or organic analysis became evident when it was realized that organic substances and particularly hydrocarbons were important reactants in the photochemical type of air pollution. Ideally, a hydrocarbon analyzer should show little or no response to the unreactive substances and high response to the reactive substances. While no analyzer has been developed that can perform such analyses directly on emission or atmospheric samples, subtractive techniques can be used to remove olefins, aromatics, and aldehydes, and to determine these constituents by difference. Mass spectrometry, dispersive and nondispersive infrared instrumentation, and flame ionization analyzers have been applied to analysis for total organics in emissions or in polluted atmospheres. The combination of gas-solid and gas-liquid chromatography with a flame ionization detector provides an almost ideal method for analyses of aliphatic and aromatic hydrocarbons. Analyses of paraffinic hydrocarbons, acetylene and acetylenic hydrocarbons, olefinic hydrocarbons, and aromatic hydrocarbons are discussed. Analysis for volatile organic substances containing oxygen usually is done by colorimetric or wet methods. Methods for the determination of aldehydes, ketones, organic acids, alcohols, and other oxygenated compounds are presented. Interest in sulfur-containing compounds is largely associated with the measurement and control of effluents from th sulfate or kraft pulping process, and analysis of the organic sulfur compounds of interest is indicated. The determination of low molecular weight chlorinated substances is described, including analyses for chlorine-containing pesticides and other halogenated substances. Analytical methods for the identification of amines, peroxyacyl nitrates, alkyl nitrates, and nitroolefins are presented.

15835 APTIC NO. 34279

Araki, Takashi

MEASUREMENT AND PROBLEMS OF AIR POLLUTANTS. *(Taiki osen busshitsu no sokutei to mondaiten). Text in Japanese. Preprint, Industrial Public Nuisance Council, Tokyo (Japan), 16p, 1971. 4 refs. (Presented at the Public Nuisance Symposium, 6th, Tokyo, Japan, Oct. 20-21, 1971.)*

The purpose and methods of air pollutant measurement, sampling quantity, frequency, and time, various measurement methods designated by the Japanese Industrial Standards, and the method of producing a standard gas are briefly discussed. Analytical methods for sulfur oxides, nitrogen oxides, carbon monoxide, hydrocarbons, oxidants, and bad odors are explained. The electroconductivity measurement is used for detecting the total amount of sulfur dioxide and sulfur trioxide in the air, which is absorbed in hydrogen peroxide solution and measured automatically. Automatic absorption photometry is used for measuring NOx in the air, using the reaction of naphthyl ethylenediamine chlorine salt and sulphanyl acid to nitrous acid ion. However, it is not certain how much nitrogen dioxide in the solution reacts to this method. Carbon monoxide is analyzed by non-dispersion infrared analyzers. The positive filter method is explained. Gas chromatography is used for organic elements such as hydrocarbons, aldehydes, and alcohols. Gas chromatography is effective especially for analyzing various photochemical elements such as peroxyacyl nitrates. Analyses of ozone in oxidant is usually conducted by coulometry or absorption photometry. The nature of odor is complex and varied, and satisfactory measurement methods have not been developed. However, successful analyses of hydrogen sulfide or mercaptan have been reported using gas chromatography with a flame photometric detector.

15836 APTIC NO. 34126

Bailey, D. L. R., C. M. Killick, and P. E. Trott

STANDARD METHOD FOR SAMPLING AIRBORNE FLUORINE COMPOUNDS. *Warren Spring Lab., Stevenage (England), Rept. LR 129(AP), 7p., Sept. 1970. 6 refs.*

A standard method for sampling and analyzing fluorine compounds in the atmosphere is presented. The sample is collected by an impinger. The fluoride is then distilled to remove interfering matter and the distillate is analyzed by colorimetry and read on a spectrophotometer. Equipment design and process description are included.

15837 APTIC NO. 33810

Baumeister, Ruediger and Helmut Schievelbein

SIMPLE METHOD FOR DETERMINATION OF SMALL AMOUNTS OF CYANIDE IN CIGARETTE SMOKE AND BIOLOGICAL MATERIALS. *(Einfache Methode zur Bestimmung von kleinen Mengen Cyanid in Zigarettenrauch und biologischem Material). Text in German. Fresenius Z. Anal. Chem., 255:362-363, 1971. 5 refs.*

A colorimetric method for the measurement of cyanide that is based on the principle of oxydizing hemoglobin into methemoglobin capable of forming a stable complex with cyanides is discussed. The hemoglobin reagent is prepared by dissolving 0.034 gr of hemoglobin in a sodium nitrite solution, to which 50 cu cm of a metaphospahte buffer and further sodium nitrite solution is added to obtain a total volume of 100 cu cm. The test preparation is made by adding 0.5 cu cm of the sample to be tested to 4.0 cu cm of the hemoglobin reagent. After 30 minutes this mixture is colorimetrically measured and compared with the colorimetric measurement of a preparation composed of 4.0 cu cm hemoglobin reagent and 0.5 cu cm of distilled water. To test the cyanide concentration in cigarette smoke, two brands of cigarettes in batches of ten were smoked by a suction pump, and the smoke was led through a bottle containing 50 cu cm of a sodium hydroxide solution. Samples of 0.5 cu cm of the solution were then used for testing. Considerable deviations between individual results occurred, ranging with one brand from 60 to 180 micrograms of cn/gr of tobacco, and with the other brand from 45 to 90 mcg cn/gr of tobacco.

15838 APTIC NO. 33446

Belyakov, A. A., A. Ya. Tubina, and V. R. Smirnova

METHODS FOR DETERMINING HARMFUL SUBSTANCES IN THE AIR IN TOXIC CHEMICAL PRODUCTION PLANTS. *(Metody opredeleniya vrednykh veshchestv v vozdukhe v proizvodstvakh yadokhimikatov). Text in Russian. In: Nov. Obl. Prom. Sanit. Khim. 1969. S. I. Muraveva (ed), 1969, p. 89-99. 10 refs.*

The methods were elaborated for the determination of chemicals occurring in the air during the production of toxic chemicals. The determination of amines in the air is based on the reaction of azo-compound with alpha - naphtol. The sensitivity of the method is .5-1.0 microgram of amine in two ml of solution. The p-chlorophenylisocyanate determination is based on its hydrolysis to p-chloroanilin. The conditions of the isolated determination of p-chloroanilin and p-chlorophenylisocyanate were found. The sensitivity of the determination is one microgram of p-chlorphenylisocyanate in two ml of solution. The conditions of determination of chlorophenylisopropyl and phenylisopropylcarbamate were studied. On hydrolysis, the latter releases amines, which can be determined. Sensitivity of determination is one microgram/two ml solution. The conditions for more accurate phosgene determination were found and the method of isopropylchlorocarbamate determination elaborated, which are based on reaction with sulfathiazole and with nitrites. Sensitivity is one microgram/five ml solution. A method for chlorobenzene determination is proposed based on polymethin dyes formation. Technical hexachloran is measured by reduction, where benzene is formed and determined colorimetrically with a sensitivity of two micrograms/two ml. Also, HCl is formed which can be determined by reaction with silver nitrate with sensitivity of five micrograms/two ml solution. A polarographic method of the determination of gamma-isomer of hexachlorocyclohexane has a sensitivity of two micrograms/one ml solution.

15839 APTIC NO. 33334

Benarie, M. and D. Bodin

DESCRIPTION AND APPLICATION OF A CONTINUOUS APPARATUS FOR MEASURING DUST BY ABSORPTION OF BETA RAYS. *(Mise au point et essais d utilisation d un appareil continu pour la mesure de poussieres par absorption de rayons beta). Text in French.*

Pollut. Atmos. (Paris), no. 35:147-155, July-Sept. 1967. 9 refs.

The instrument described measures dust concentration from the attenuation of beta radiation emanating from a source of the isotope Pm-147 (Prometheum) by a dust deposit. Measurement results are independent of the particle size, color, refraction index, and chemical composition of the dust. The sample is collected on a section of a glass fiber filter strip (GF/A Whatman) stretched between two rotating drums which can be set for stoppages from one minute to 10 hours to collect dust. The mechanical part of the instrument is superimposed on the electronic part, and a 35-l/min aspiration pump is used with the apparatus. The volume of the dust-laden gas aspired in a unit of time is not constant but diminishes with the thickness of dust deposit; thus a corresponding measuring correction must be based on empirical data. The limit of sensitivity is about 0.3 mg/sq cm dust. The instrument has been tested in the atmosphere and on stacks of furnaces burning pulverized coal, oil, and coal, and was reliable in continuous operation over an eight-day period. The dust concentrations measured ranged from a fraction of a mg dust/cu m gas to several grams/cu m gas.

15840 APTIC NO. 33338

Berman, Eleanor

APPLICATIONS OF ATOMIC ABSORPTION SPECTROMETRY TO TRACE METAL ANALYSES OF TOXICOLOGICAL MATERIALS. *Progr. Chem. Toxicol., vol. 4:155-178, 1969. 44 refs.*

The instruments, principles and procedures used in atomic absorption spectrometry are described. This method has become an important tool for the determination of various metals during toxicological investigations and is the routine technique for analyses of lead, cadmium, thallium, mercury, and arsenic. Atomic absorption spectrometry can be used to determine the presence of lead, mercury, copper, gold, and iron in blood, urine, and body tissue. The trace analyses of cadmium, thallium, arsenic, antimony, bismuth, cobalt, chromium, lithium, manganese, nickel, tin, and zinc are also explained.

15841 APTIC NO. 33929

Bredemann, G. and H. Radeloff

THE DETECTION OF DAMAGE CAUSED BY FLUORINE EXHALATIONS. *(Zur Diagnose von Fluor-Rauchschaeden). Text in German. Phytopathol Z., 5(2):195-206, 1933. 19 refs.*

Industrial fluorine emission do not disperse as widely as sulfur dioxide emissions; 1 km away from the source no noticeable damage attributable to fluorine could be detected. Since fluorine-induced damage to plants is not characteristic and cannot be detected by botanical inspection, a microchemical analysis is necessary. Two methods are suitable. The Feigl and Krumholz method volatilizes fluorine in the form of silicon fluoride and determines Si in the distillate. The sodium fluosilicate crystal method processes plant substance with silica sand and sulfuric acid. With a sodium acetate solution easily the escaping silicon fluoride forms discernible hexagonal crystals. The natural fluorine content of the plant substance does not interfere with either method or does fluorine-rich soil from fluorine-containing phosphates. Whether fluorine damage undetectable by either method can occur is an unresolved question. If the Na_2SiF_6 crystal method, which should be applied first in case of fluorine plant damage, does not yield conclusive proof then a somewhat more sensitive method (the molybdatebenzidine color method) should be employed. If the crystal method is negative but the molydate method positive, fluorine damage is considered proven.

15842 APTIC NO. 34011

Brown, R. A. and J. M. Kelliher

THE ROLE OF REFERENCE COMPOUNDS IN THE STUDY OF POLYNUCLEAR AROMATIC HYDROCARBONS IN AUTOMOBILE EXHAUST. *American Petroleum Inst., New York, Div. of Refining, Proc. Am. Petrol Inst., Div. Refining, vol. 51:349-360, 1971. 3 refs. (Presented at the Midyear Meeting, 36th, San Francisco, Calif, May 12-14, 1971.)*

In developing a method to measure polynuclear aromatic hydrocarbons, a significant effort was devoted to calibration and identification. This problem would have been simplified by the ready availability of compounds at 95% + purity level. In the future, reliable quantitative measurements and further elucidation of constituents in automobile exhaust will be more dependent upon a source of pure reference compounds. An order of priority for synthesis is: benzo(a)pyrene, benz(a)anthracene, methylbenzo(a)pyrenes, methyl and dimethylbenz(a)anthracenes, pyrene, chrysene, triphenylene, benzo(e)pyrene, methylbenzo(e)pyrene, and benzo(g,h,i)perylene. In another method, developed for total polynuclear aromatics, many additional compounds were needed. The measurement procedures which have been utilized were chromatography with ultraviolet absorption and spectrometric techniques. (Author abstract modified)

15843 APTIC NO. 33784

Caracciolo, Carlo

A NETWORK FOR THE MEASUREMENT OF AIR POLLUTION AT THE RHINE MOUTH NEAR ROTTERDAM. *(Rete per la misurazione dell inquinamento atmosferico nello Sbocco del Reno presso Rotterdam). Text in Italian. Inquinamento, 13(4):45-47, May 1971.*

An alarm system, starting off as soon as the sulfur dioxide level in the air of the Rhine mouth region exceeds a certain limit, was installed near Rotterdam. The monitoring devices of this region, referred to as smell pillars, perform 64 determinations and compute 31 average values for SO_2 in the ambient air. They also measure the direction and strength of the winds. The system includes several sampling points, a transmission unit and the measurement instruments provided with a facility for the processing of the analytical data. The analytical instrument functions on a spectrophotometric basis and contains a bromine/potassium bromide system with sulfuric acid. The disruption of the bromine/bromide equilibrium through the presence of SO_2 is detected and determined by an electric system. The SO_2 levels in the Rhine mouth region decreased considerably during the recent years, due to this automatic alarm system. Since the network is provided with a wind measurement device, a forecast of critical air pollution conditions is made possible.

15844 APTIC NO. 34206

Cartoni, G. Paolo

GAS CHROMATOGRAPHY OF POLYNUCLEAR HYDROCARBONS. *(Analisi gascromatografica di idrocarburi polinucleari). Text in Italian. Cron. Chim. (Milan), vol. 22:20-23, 1968. 5 refs.*

Capillary columns, high-efficiency columns coated with several liquid phases, were used for gas chromatographic analysis of polynuclear hydrocarbons. The retention indices are measured isothermally and in programmed temperatures. Hydrogen flame and electron capture detectors are used and their relative responses compared. These values are useful in the identification of various hydrocarbons. Two coupled detectors, placed in parallel at the outlet of the column can be used to obtaina double-trace chromatogram. Polynuclear hydrocarbons are extracted from atmospheric dust and determined by programmed gas chromatography.

15845 APTIC NO. 34106

Cate, J. L., Jr.

DETERMINATION OF LEAD IN AIR SAMPLE FILTERS BY X-RAY FLUORESCENCE ANALYSIS. *California Univ., Livermore, Lawrence Radiation Lab., Atomic Energy Commission Contract W-7405-Eng-48, UCRL-51038 TID-4500, UC-4 Chemistry, 7p., April 23, 1971. 5 refs.*

NTIS: UCRL-51038

A silicon(lithium) detector was tested for the most efficient exciter-collimator combination for analysis of lead on filter papers and calibrated with Pb (24) standards. The maximum signal two-to-background (S2/B) ratio was achieved using an americium(241) exciter and counting only the Pb L alpha line. The minimum detectable quantity of lead for a 10-min count was 0.206 microgram/sq cm, or a total of 1.36 microgram on standard 2.9-cm-diameter filter disks. Calibration results show the sensitivity of the detector is about 160 counts/min at low Pb concentrations.

15846 APTIC NO. 34135

Cavender, James H. and Norman A. Huey

CONCLUSIONS. *In: Interstate Surveillance Project: Measurement of Air Pollution Using Static Monitors. Air Pollution Control Office, Research Triangle Park, N. C., Interstate Surveillance Project, APCO Pub-APTD-0666, p. 59-60, May 1971.*

NTIS: PB 200519

The results of the Interstate Surveillance Project are reviewed and evaluated. The effects sampler was capable of detecting sulfur oxides, particulates, nitrogen oxides, hydrogen sulfide, acid aerosols, and oxidants and could detect gross differences in pollution levels. The components of the sampler provided evidence of air pollution effects. The efficiency and limitations of the network are examined.

15847 APTIC NO. 34146

Chatot, G., M. Castegnaro, J. L. Roche, and R. Fontanges

STUDY OF THE POLYCYCLIC AROMATIC HYDROCARBONS FROM THE ATMOSPHERE OF LYONS. *(Etude des hydrocarbures polycycliques aromatiques de l atmosphere de Lyon). Text in French. Chromatographia, 3(11):507-514, 1970. 20 refs.*

A qualitative study of atmospheric polyaromatic hydrocarbons was made using thin layer chromatography, gas chromatography, ultraviolet spectrophotometry, and spectrofluorometry. The study was facilitated by a previous purification process of the polyaromatic hydrocarbons.

15848 APTIC NO. 33552

Consolazio, W. V., L. J. Pecora, E. MacDonald, H. A. Collison, N. L. Kreuger, W. T. Platt, J. D. ONeal, and J. A. Rae

THE EVALUATION OF METHODS FOR DETERMINING THE CONCENTRATION OF CARBON MONOXIDE. *Naval Medical Research Inst., Bethesda, Md., Research Proj. X-417, Rept. 5, 15p., Feb. 23, 1945. 11 refs.*

NTIS, DDC: AD 717876

Analytical methods available for ground-level use by trained technicians for determining low (25 ppm) and aeronautically significant (up to 350 ppm) concentrations of carbon monoxide in the air were evaluated. Of all the methods tested, the iodine pentoxide train yielded the most reliable and reproducible results. Since it requires a high degree of skill, its use is necessarily limited to research laboratories. It was employed as the standard of reference after comparison with the method of pressure mixing. The Bureau of Mines method was the most ideal method for routine laboratory use. One limitation was the need for considerable specialized equipment, but no special training on the part of the operator was necessary. The Beckman-McCullough method may be considered the ideal for use by aircraft manufacturers or naval activities. Some modifications must be made but it requires little technical skill. It is self-contained, utilizes a small sample of gas, and requires only about 15 minutes for complete analysis. The National Bureau of Standards method is self-contained, requires a minimum of equipment and little training, but is not sufficiently accurate for aircraft acceptance tests. The Wright Field modification of this method differs in that the time to develop a given color is measured instead of the color developed in a given time. The observer s ability to discriminate color intensity critically during progressive change influenced the accuracy of the results. Considerable judgment must be exercised in evaluating aircraft acceptance data obtained by this method. (Author summary modified)

15849 APTIC NO. 33454

Crawley, R. H. A.

SPECTROPHOTOMETRIC DETERMINATION OF BERYLLIUM IN AIR AND DUST. *Anal. Chim. Acta, vol. 22:413-420, May 1960. 14 refs.*

It is generally accepted that, in areas where beryllium is handled, beryllium in air should not exceed an average of 2 micrograms/cu m over an 8-hr working day or 25 micrograms/cu m for any period, however short. The average monthly concentration of beryllium in air should not exceed 0.01 microgram/cu m. These levels require an analytical method that is simple, rapid, highly specific for beryllium, with a lower limit of about 0.1 microgram beryllium. The requirements are met by collecting beryllium-containing dust on a membrane filter, obtaining the beryllium in solution, adding aurine tricarboxylic acid (aluminon) as reagent, and spectrophotometrically determining absorption at 5300 A. The method is a satisfactory alternative to the spectrographic method in determining beryllium for monitoring purposes.

15850 APTIC NO. 33800

Dietz, Russell N. and Edgar A. Cote

GC DETERMINATION OF SULFUR HEXAFLUORIDE FOR TRACING AIR POLLUTANTS. *Am. Chem. Soc., Div. Water Air Waste Chem., Gen. Pap., 11(2):208-215, 1971. 7 refs. (Presented at the American Chemical Society, Division of Water, Air and Waste Chemistry, National Meeting, 162nd, Washington, D. C., Sept. 12-17, 1971.)*

An improved method for the direct determination of less than one part of sulfur hexafluoride in 10 to the 13th power parts of air without pre-concentration or elaborate carrier gas purification is described. An application of this chromatographic method to a real-time SF6 analyzer for location of plumes and determination of SF6 concentration gradients of plume cross-wind sections is discussed. Calibration and typical chromatographs are considered.

15851 APTIC NO. 33456

Donaldson, H. M., R. A. Hiser, and C. W. Schwenzfeier

REALISTIC AIR SAMPLING OF BERYLLIUM PRODUCTION FACILITIES. *Am. Ind. Hyg. Assoc. J., 25(1):69-76, Jan.-Feb. 1964. 13 refs.*

Tests made in beryllium handling facilities using two-stage samplers which separate the sample into approximately respirable and non-respirable fractions are described. Using both the HASL and the Aerotec II Cyclone which fractionate dust closely to upper respiratory retention parameters, monitoring results showed that the respirable portion of the airborne beryllium dust may vary from a few percent to over 90% depending on environment. Generally, the higher total airborne exposures show a smaller percentage of respirable dust. The dust produced in lathing, milling, drilling, and other related machine shop operations is essentially non-respirable, which indicates that alteration to beryllium parts can be made in an uncontrolled machine shop and the respirable air levels generated will remain below target level of 2.0 micrograms beryllium per cu m. The apparently insurmountable engineering feat of controlling large beryllium production facilities to target level or below can be accomplished using good local exhaust ventilation and hooding techniques.

15852 APTIC NO. 33687

Dunn, Richard L.

SIMPLIFIED GUIDE TO STACK PARTICULATE SAMPLING EQUIPMENT. *Plant Eng., 25(21):91-94, Oct. 14, 1971.*

The measured efficiency of air pollution control equipment may vary considerably depending on the methods used to sample its emissions. Particulate emissions are defined either in terms of rate (weight emitted per unit of time) or volume (weight per volumetric unit). To compute these values, sampling personnel must know the weight of the particles collected, the velocity of the stack gases, and the gas density which, in turn, requires that they determine the gas temperature, static pressure, and molecular weight. Particulate sampling is accomplished by means of a sampling train; that is, a combination of components in series. Such a train must include a sampling probe, a separation device (collector) to remove the particulate matter, a sample flowmeter, temperature and pressure measuring instruments, and a pump to draw the sample through the train. Isokinetic and nonisokinetic sampling are mentioned. Various collectors include cyclones, filters, electrostatic precipitators, thermal precipitators, and impactors.

15853 APTIC NO. 34001

Ellis, Eddie E.

AUTOMATIC DATA ACQUISITION SYSTEM. *Ind. Waste, p. IW/2-IW/5, Sept./Oct. 1971.*

Continuous monitoring of air and water pollution using electronic data processing and automatic data acquisition systems is reviewed. Operational procedures, including sampling, transmission, reconstruction to digital words, signal conversion, and computer processing, are examined. The total cost of the station was less than $35,000; the effectiveness of the system was proved in actual operation.

15854 APTIC NO. 34093

Fiorentina, Della H.

THE MEASUREMENT OF CATIONS IN THE ATMOSPHERE. *(Le dosage des cations dans l air). Text in French. Tribune CEBEDEAU (Centre Belge Etude Doc. Eaux), 23(324):482-486, Nov. 1970.*

Cations in particles suspended in the atmosphere of urban and industrial regions can be measured by emission spectroscopy X-ray fluoroscopy, polarography, colorimetry, and atomic absorption spectrophotometry. The last of these methods, while less sensitive than colorimetry, is interesting because it is specific, fast, and has a wide field of application. The sample, taken on a glass wool filter, is calcined in a low-temperature asher because of the high content of organic matter which would interfere with the measurement and because of the metals must be solubilized before dispersal into the flame by fogging. The calcined residue is digested in 20% nitric acid or water for 20 hours; the dissociation of molecules into atoms is accomplished by dispersing the sample in a flame. In this state the atoms absorb radiation of characteristic wavelength (resonance rays). Measurement is based on the principle that the atomized element will absorb in the flame a quantity of energy of the resonance radiation proportional to the concentration of the atoms in the sample. The drawbacks of the method and a step-by-step description of the procedure are given.

15855 APTIC NO. 33465

Giever, Paul M.

ANALYSIS OF NUMBER AND SIZE OF PARTICULATE POLLUTANTS. *Air Pollution. Arthur C. Stern (ed.), Vol. 2, 2nd ed., New York, Academic Press, 1968, Chapt. 21, p. 249-280. 45 refs.*

In any operation that will eventually require counting or sizing of particulate pollutants as an evaluation technique, the most suitable instrument for obtaining the specimen must first be selected; and the sample then collected and prepared in a manner that will yield an accuracy equal to the requirements of the problem. The principal methods of sample collection for determination of number and size of particulate pollutants include gravity or settlement, filtration, impingement, electrical precipitation, and thermal precipitation. Where the sample is to be used for estimation of exposure to pneumoconiosis-producing dust, the standard light field counting technique should be used. Samples should be collected with the Greenburg-Smith or midget impinger using dust-free distilled water, isopropyl or ethyl alcohol, or a mixture of alcohol and water. The use of alcohol is preferable for collection of dusts that may be soluble or that flocculate in water, and where oil mists may interfere with the counting of mineral dusts. Counting techniques are discussed, including evaluation by optical and electron microscopy. For the general case of nonspherical particles, particle size may be defined in many different ways in terms of equivalent diameters which depend on various geometrical or physical properties of the particles. It is evident that the particle size for irregularly shaped particles will depend upon the physical principles employed for determining the average dimension or equivalent diameter, and, in general, no two methods can be expected to agree. Sieving, size analysis by optical microscopy, electron microscopy, sedimentation, elutriation, centrifugal classification, impactors, and automatic instruments for particle size analysis are discussed.

15856 APTIC NO. 34178

Gridgeman, N. T.

DESIGNS FOR MULTIPLE PAIR-COMPARISON SENSORY TESTS. *Can. Inst. Food Technol. J., 3(1):25-28, 1970. 6 refs. (Presented at the International Congress of Food Science and Technology, 2nd, Warsaw, Poland, 1966.)*

If the relative sensory quality -- in terms, say, of intensity or delectability of flavor or odor or texture -- of a number of different food products has to be subjectively determined, the method of paired comparison offers attractions. This is because of task simplicity; that is, the subject (the panel member) has merely to choose between two alternatives according to some agreed criterion, and he has no problems about scaling or scoring to worry about. If the number of samples is n, there is in all n(n 1)/2 pair combinations to be made. Schemes for allocating the pairs equitably among a panel of n 1 subjects (if n is even) or n subjects (if n is odd) are given.

15857 APTIC NO. 33575

Guicherit, R.

OZONE ANALYSIS BY CHEMILUMINESCENCE MEASUREMENT. *Fresenius Z. Anal. Chem., 256(3):177-182, 1971. 7 refs.*

Ozone concentrations in ambient air can be determined by measuring light emitted by reaction with the chemiluminescent dye Rhodamine B. The stability of the light emission is increased by protecting the dye with another compound which reacts with ozone more easily, i.e., gallic acid. The stability of the chemiluminescent surface is further increased by an intermittent sampling procedure. This is accomplished by means of a three way valve allowing the passage of ozone-containing air for about 15 sec in each minute, followed by the passage of ozone-free air for about 45 sec. This method permits a simultaneous check of the zero point. The method is highly selective. No interference from nitrogen dioxide, chlorine, sulfur dioxide, hydrogen sulfide, ammonia, hydrochloric acid, hydrogen peroxide, and hydrogen fluoride, has been observed at concentrations up to two ppm. The sensitivity of the chemiluminescent surface is decreased by adsorbed moisture. The moisture problem can be eliminated by coating the surface with a hydrophobic ompound and by controlling the relative humidity of the ozone-free air introduced into the reaction chamber between the actual ozone measurements. Temperatures fluctuating between 18 and 24 C have a negligible influence on measurements. The reproducibility is very good. Deviations of more than five percent have never been observed. (Author abstract modified)

15858 APTIC NO. 34171

Haaland, Harold H. (ed.)

METHODS FOR DETERMINATION OF VELOCITY, VOLUME, DUST AND MIST CONTENT OF GASES. *Joy Manufacturing Co., Los Angeles, Calif., Western Precipitation Div., Bull-WP-50, 40p., 1968.*

In order to determine the performance of an existing gas handling or gas cleaning system, to evaluate the necessity of installing a cleaning system, or to obtain information for the design of a cleaning system, it is necessary or desirable to obtain a measure of the concentration and character of the dust in the gas stream, and accurate data regarding the temperature, velocity, and volume of the gas stream itself. A standard method of procedure is outlined for the study of gas streams contained in industrial flue systems as well as for the suspended matter carried by these gases. Membrane filters, impingers, and various other sampling methods are discussed. Gas velocity and volume calculations are presented.

15859 APTIC NO. 34017

Hasegawa, Toshio and Akiyoshi Sugimae

EMISSION SPECTROGRAPHIC DETERMINATION OF LEAD AND MANGANESE IN AIR BORNE PARTICULATES. *(Hakko bunsekiho ni yoru fuyu funjin-chu no namari oyobi mangan no teiryo). Text in Japanese. Bunseki Kagaku (Japan Analyst) (Tokyo), 20(11):1406-1411, Nov. 1971. 11 refs.*

Lead and manganese in airborne particulates were collected on sequential filter tape once every hour and analyzed spectrographically. Preparation of the electrodes is discussed. Moving-plate studies indicated that no vaporization of lead and manganese occurred during the first 15-sec period when the background was high; then the vaporization be an and continued during the next 30 sec of arcing. Linear calibration lines were obtained over a range of 0.3-6.0 micro rams lead/cu m air and 0.06-1.20 micro rams manganese/cu m air. Variation coefficients for lead and manganese were 14.5 and 8.1, respectively. (Author abstract modified)

15860 APTIC NO. 33655

Heyder, J., C. Roth, and W. Stahlhofen

A LASER SPECTROMETER FOR SIZE ANALYSIS OF SMALL AIRBORNE PARTICLES. *Aerosol Sci., 2(3):341-352, Aug. 1971. 10 refs.*

The particle size distribution in an aerosol is measured by analyzing the light scattered by each particle in a nearly forward direction. The particles are illuminated in a laser beam; the light scattered is collected by a microscope objective and passed to a red sensitive photomultiplier, the amplified output pulses of which are stored in a multichannel pulse height analyzer. The signal-to-noise ratio of the spectrometer makes it possible to measure particles down to 0.1 micrometer in diameter. This sensitivity was obtained by focusing both the laser beam and the aerosol stream. The optical system and light detection system of the particle size spectrometer are described, as well as the aerosol inlet. Adjustment and calibration of the spectrometer are discussed. Background scattering is considered. Resolution power of the spectrometer is calculated, and measurement limitations are defined. (Author abstract modified)

15861 APTIC NO. 33681

Hinohara, Keiichi

SOOT CONCENTRATION COUNTERS. *(Baien nodokei ni tsuite). Text in Japanese. Nenryo Oyobi Nensyo (Fuel and Combustion), 38(10): 65-71, Oct. 1971.*

Various methods of measuring soot concentration in exhaust gas are discussed. Measuring the qualitative and quantitative soot quantity is standardized in JIS Z 8008: Method of Measuring Soot Particulates in Flue Exhaust Gas. Two methods designated are: g/Nm2 concentration of soot in dry exhaust gas; and total soot quantity in kg/hr in exhaust gas. Since carrying out these methods manually requires much care, skill in technique, time, and manpower, automatic measuring apparatus on JIS principles are being developed by various institutions. Mitaka Engineering Company s automatic continuous soot measuring apparatus consists of an equilibrium sampler tube, the measuring device, a panel for the gas cleaning system, and a panel for gas suction. Sampling gas goes through a heating conduit and enters the main body of the apparatus where a filter paper captures soot. The gas goes out and is cooled and metered. At every given quantity of gas flow, the meter signals; a counting relay counts the figure indicated by the signal, and when it reaches a certain value, stops the pump automatically. The filter paper comes out, a new filter paper is automatically inserted in the capturing mechanism, and the pump starts the suction movement again. When a set number of filter papers is inserted in the main system, the paper is supplied one by one; the paper is dried, measured, set in the machine, and captures soot. After the entire weight of the paper and soot is taken, the paper is discharged outside the main body of the apparatus.

15862 APTIC NO. 33455

Hiser, R. A., H. M. Donaldson, and C. W. Schwenzfeier

A RAPID ANALYTICAL METHOD FOR THE DETERMINATION OF BERYLLIUM IN AIR SAMPLES. *Am. Ind. Hyg. Assoc. J., 22(4):280-285, Aug. 1961. 7 refs. (Presented at the American Industrial Hygiene Association, Annual Meeting, 22nd, Detroit, Mich., April 1961.)*

The Zenia method, a rapid analytical technique for the analysis of beryllium in air samples, consists of the addition of p-nitrophenylazoorcinol to a prepared beryllium sample. A Klett photometer reading of the adsorption of the resulting color, using a no. 54 filter, is taken and compared with a standard curve to give a measure of the amount of beryllium in the sample. This method is limited to in-plant sampling where collection is attained with Whatman no. 41 filter paper. Any element that forms a color in alkaline solution will interfere. However, many interfering constituents, like heavy metals, may be chelated with Versene T or complexed with cyanide. The presence of magnesium and chloride interfere with the method. Samples containing between 5 and 45 mg beryllium show a standard deviation of 8.4% and 68% confidence level for values between plus or minus 8.4% of true value, or a 95% confidence level for values falling within plus or minus 16.8%. Such analytical accuracy is adequate for the in-plant monitoring of a beryllium facility. (Author summary modified)

15863 APTIC NO. 34139

Huey, Norman A. and Maurice Georgevich

DESCRIPTION OF MONITORING UNIT. *In: Interstate Surveillance Project: Measurement of Air Pollution Using Static Monitors. Air Pollution Control Office, Research Triangle Park, N. C., Interstate Surveillance Project, APCO Pub-APTD-0666, p. 9-15, May 1971.*

NTIS: PB 200519

The monitoring unit of the Interstate Surveillance Project is examined. The components included steel or zinc panels to determine metal corrosion by sulfur dioxide; a dyed fabric panel to indicate color fading by ozone or nitrogen dioxide; nylon panel for materials deterioration by acid aerosols; a silver plate to measure tarnishing by hydrogen sulfide; rubber strip to indicate cracking by ozone; sulfation candle and plate to determine sulfur dioxide; dustfall bucket; and adhesive impaction paper to measure soiling by windblown particulates.

15864 APTIC NO. 33671

Ikuta, Sakae and Kuniharu Ishii

HIGH REPETITION CYCLE LASER RADAR FOR AIR POLLUTION. *(Taiki osen kanshi-yo reza reda ni tsuite). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 7(10):39-44, 1971. 8 refs.*

Toshiba laser radar, is simpler and less expensive than previous microwave radars. The indicator sweeps synchronously with the laser rays at a given speed; the angle signal producer impresses the voltage applicable to the present position of the scanner on the vertical shaft; echoes from the target object are amplified by the receiver; and electric pulse signals are supplied to the radiance transformation terminal. When echo pulses return, radiation indicates the direction, elevation angles, and distance on the indicator. The apparatus consists of a transmitter system (laser oscillation), a receiver system, a signal treatment system, a scanner mechanism, and a power source cooling system. Transmission power peak is five MW; pulse cycle is 64 PPS; beam spread angle is one mrad; pulse width is approximately 20 ns; pulse producer is YAG laser of 1.06 micron; receiver antenna is 250 mm diameter, single lense with focus 1000 mm; visual field angle is eight mrad; band pass filter is multilayer interference filter with central wave length of 1.0635 micron, central permeability 84%; receiver is RCA 7102; amplifier has three steps (10, 100, 1000 times); reaching distance is approximately 10 km; distance analysis capacity is six m; direction analysis capacity is three mrad; scanner range is 0 360 degrees of direction and 0 to 45 degrees of elevation; and finally, ion conversion water cools YAG rod and Xe flashlamp.

15865 APTIC NO. 33953

Jackson, R. and R. A. Granville

MEASUREMENT OF DUST IN FLUE GAS. *Iron Steel Inst., London, Spec. Rept., no. 61:119-128, 1958. 7 refs. (Presented at the Iron and Steel Institute, Air Pollution Meeting, London, England, Sept. 25-26, 1957.)*

Principles of dust sampling are reviewed, and the design of sampling equipment is discussed. The primary object in most dust measurements is to determine the amount of dust passing through a selected cross-sectional area of a duct. The equipment consists of a probe tube carrying, at the sampling end, a small high-efficiency cyclone with a removable dust hopper. Many of the iron and steelmaking processes, particularly those involving the use of oxygen, generate an iron oxide fume which is carried out of the system in a stream of hot gas. Since these particles of fume are mainly submicron in size and cannot be collected by a cyclone sampler, equipment has therefore been designed which will permit rapid isokinetic fume sampling in hot corrosive gases. Dust measurements of emissions from batch-type and continuous sinter plants are described, as well as from producer-gas cleaners and open-hearth furnaces. Results from field tests are presented. Dust samples collected in various tests were sized by sieving down to 53 microns.

15866 APTIC NO. 33633

Jager, Jiri

DETERMINATION OF BENZANTHRONE IN THE ATMOSPHERE BY FLUORESCENCE SPECTROGRAPHY. *(Stanoveni benzanthronu v ovzdusi pomoci fluorescencni spektrografie). Text in Czech. Chem. Listy, 65(9):868-871, 1971. 8 refs.*

Benzanthrone is determined by measuring the intensity of its fluorescence maximum (at 465 nm) at the boiling point of nitrogen. Benzanthrone is separated from other components of a sample by thin-layer chromatography on alumina and silica gel. Losses with the procedure are 18% if the initial concentraton on solid particles is 10 microgram/g. The experimental arrangement described permits 0.1 microgram of benzanthrone in one/ml of a final solution to be determined with an accuracy of plus or minus 0.02 microgram. (Author abstract modified)

15867 APTIC NO. 34225

Janzen, Edward G.

SPIN TRAPPING. *Accounts Chem. Res., 4(1):31-40, Jan. 1971. 56 refs.*

The development of the spin-trapping technique for detecting and identifying low concentrations of free radicals in reacting systems is reviewed. This technique involves trapping a reactive free radical by an addition reaction to produce a more stable radical, detectable by electron spin resonance, whose hyperfine coupling parameters permit identification of the trapped radical. Preliminary laboratory work with the following spin traps is reported: nitroso-tert-butane (NtB), 2-methyl-2-nitroso-3- butanone, nitrosobenzene, phenyl tert-butyl nitrone (PBN), and unsubstituted tert-butyl nitrone. The advantages and disadvantages associated with each trap are noted, and NtB and PBN are shown to trap numerous different types of radicals. Two examples involving atom trapping, fluorine and chlorine, illustrate another advantage of PBN. Other areas of application of spin trapping include detection of gas-phase free radicals, detections of radicals present in solids, and studies of the reactions of hydroxy radicals. Spin trapping and CIDNP techniques (which depend on the strong polarization of certain nuclear spins by the unpaired electron during the molecules existence as a free radical) are complementary in nature. Radicals can probably be detected at lower concentrations and more readily by spin trapping, but information about the history of the radical ion can sometimes be deduced from CIDNP experiments.

15868 APTIC NO. 33711

Kaneda, Kazuko

DETERMINATION BY THE SEPARATION OF GASEOUS AND PARTICULATE FLUORIDE. *(Gasu jo oyobi ryushi jo fukkabutsu no bunrisokuteiho). Text in Japanese. Niigata-ken Eisei Kenkyusho Shudankai Shoroku (Niigata Prefect. Public Health Lab. Meet. Abstr.), 1970:14-15, 1970.*

Results of fluoride determination as a particulate, using filter paper, and in gaseous form, adsorbed by aluminium, glass spiral, and unglazed tubes, were examined. For collecting particulate fluoride, seven filters millipore were compared; AA had the smallest gas absorption. For the separation of gaseous fluoride, the almost 100% HF gas was collected by the glass spiral tubes. Separation of gaseous and particulate fluoride was effected by passing particulate fluoride through the tube and then collecting the fluoride on alkaline filters. On the assumption that the rate of particulate to total fluorides was 50-70%, when 4 ppb total fluorides were in the air, particulate and gaseous fluorides were separated with millipore and alkaline filters at 20 ml/min and determined by the analysis of ion electrodes.

15869 APTIC NO. 33395

Kawai, Misao

DETERMINATION OF SULPHUR OXIDES IN FLUE GASES. *(Hai gasu chu no io sankabutsu sokutei hoho). Text in Japanese. Ryusan (J. Sulphuric Acid Assoc., Japan), 24(1):19-34, Jan. 1971. 12 refs.*

Methods and equipment for gas sampling and various sulfur oxide analysis methods are discussed. All types of sulfur oxides can be analyzed by neutralization, the arsenazo III method, or the chloranile acid barium method. Sulfur dioxides can be analyzed by the iodine titration method, continuous analysis method, or detecting apparatus method. The iodine titration method can be used for correction of the last two methods. In this method, SO2 absorbed in sulfamine acid salt solution is titrated by iodine standard fluid. Reagents are: 0.5 g soluble starch paste added little by little to 100 ml of boiling, saturated saline water and boiled for two minutes; 100 ml of N/10 iodine solution mixed with water to make one liter, in which three drops of chlorine is added. Five ml of the star solution is added to v ml (10-100 ml) of test material, and titrated with the iodine solution until it turns blue. The same titration is given twice to the absorbent and the average is taken. Sulfur dioxide content in the test material is calculated by an equation. The continuous method, the solution conductivity method, and the infrared analysis method are discussed with detailed descriptions and illustrations.

15870 APTIC NO. 33453

Keenan, Robert G. and John L. Holtz

SPECTROGRAPHIC DETERMINATION OF BERYLLIUM IN AIR, BIOLOGICAL MATERIALS, AND ORES USING THE SUSTAINING A.C. ARC. *Am. Ind. Hyg. Assoc. J., 25(3):254-263, May-June 1964. 22 refs.*

A spectrographic method is described using a sustaining a.c. arc, for the quantitative determination of beryllium in amounts as low as 0.001 microgram. The method is based upon the excitation of beryllium volatilized from a chloride matrix which is prepared from a lithium chloride-graphite buffer, liver ash, and the ashed or fused sample. Experiments with beryllium 7 provided quantitative recoveries of the radioactive tracer from urine samples and from bertrandite and beryl ores. In six out of eight cases, application of the method to samples of beryllium ores provided less than 10% deviations from the results of chemical analyses by the U. S. Bureau of Mines. Procedures for sample preparation of body tissue, urine, atmospheric dust and fumes, and ore specimens are included. (Author abstract modified)

15871 APTIC NO. 34125

Killick, C. M.

THE MEASUREMENT OF ATMOSPHERIC FLUORIDES BY REACTION WITH SELECTED FILTER MATERIALS. *Warren Spring Lab., Stevenage (England), Rept. LR 130(AP), 14p., Aug. 1970. 12 refs.*

Glass fiber and silver membrane filters were used to absorb gaseous fluoride at atmospheric concentrations. Compared with the standard impinger method, the collection efficiency was below 50% and the absorbed fluoride was hard to remove. The glass fiber filter contained high intrinsic levels of fluoride which could not be removed without destroying the filter. (Author abstract modified)

15872 APTIC NO. 34186

Kobayasi, Takao and Humio Inaba

SPECTROSCOPIC DETECTION OF SO2 AND CO2 MOLECULES IN POLLUTED ATMOSPHERE BY LASER-RAMAN RADAR TECHNIQUE. *Appl. Phys. Letters, 17(4):139-141, Aug. 15, 1970. 11 refs.*

Using a Q-switched ruby laser beam, Raman backscatter is reported from sulfur dioxide and carbon dioxide molecules in the polluted atmosphere. The backscattered radiation was detected by an RCA 7265 photomultiplier and displayed on a 30-MHz dual-beam oscilloscope. Each laser output was monitored by a high-speed photodiode and simultaneously displayed on the oscilloscope. Spectroscopic observations of Raman backscatter were made of an oil smoke plume, the ordinary atmosphere, and the plume when solid sulfur was burned. One of the most valuable applications of this laser-Raman radar technique is its use in calculating the distribution of molecular density in the polluted atmosphere.

15873 APTIC NO. 33614

Kozelkina, Z. V., V. V. Kozelkin, and N. T. Otroshko

METHOD FOR THE DETERMINATION OF SOLID PARTICLE CONCENTRATIONS IN GASEOUS SUSPENSION STREAMS. *(Metodika opredeleniya kontsentratsii tverdykh chastits v potoke gazovzvesey). Text in Russian. Zavodsk. Lab. (Moscow), 37(3):307-308, 1971.*

The concentration of solid particles in various points of a gaseous suspension stream is determined by means of a small-size riezoelectric detector. The electronically amplified kits, produced by the stream particles upon the detector's surface, are recorded by a loop oscillograph. A model of such a device and recording obtained within a stream of a gaseous suspension of 200-250 micron size corundum particles is illustrated. The amount of impulses per time unit as related to the detector's surface characterizes the concentration of particles for a given cross section. The repeated recording for a given point per time unit allows to determine the average statistical value of the particle concentration within this point. The substitution of the loop oscillograph by a standard electronic impulse counter simplifies the counting operation. The indications of the counter allow then a direct determination of the number of impulses occurring at any time interval.

15874 APTIC NO. 33661

Krohne, L.

RADIOMETRIC DUST MEASURING UNIT. *(Radiometrisches Staubmessgeraet). Text in German. Umwelt (Duesseldorf), 1(5):59, Oct./Nov. 1971.*

For radiometric dust measurement a defined gas sample is drawn off from the main gas flow and passed over a glass fiber filter. The dust retained in the filter is measured by determination of the radiation absorption of the radioactive isotope carbon (14). This radiometric mass determination, which is independent of the type of dust and the grain size, is equivalent to the gravimetric measurement. The dust concentration is recorded in mg/cu m. The measurement range can be selected from 0 to 10 mg/cu m to 0-1000 mg/cu m. The tolerance is plus or minus 10%. The dust measuring unit is most suitable for controlling the efficiency of dust collectors and filters with high accuracy as it is required in the metallurgical industry, the cement industry, in incinerators, in the chemical industry, and in power plants.

15875 APTIC NO. 33632

Kubec, Zdenek and Ema Maierova

USE OF SELECTIVE FLUORIDE ELECTRODE IN CONTROLLING THE PRODUCTION OF HYDROGEN FLUORIDE. *(Pouziti selektivni fluoridove elektrody pri kontrole vyroby kyseliny fluorovodikove). Text in Czech. Chem. Prumsyl (Prague), 21(46):388-389, 1971. 4 refs.*

A procedure is desribed for determining total fluorine in waste calcium sulfate and in the waste gas formed in the production of hydrogen fluoride from a fluorite concentrate. Analysis is based on measuring the potential of a selective electrode (Crytur 09-17) in a suitably treated sample solution. The procedure facilitates control of hydrogen fluoride production. (Author abstract modified)

15876 APTIC NO. 33748

Lahmann, Erdwin and Karl-Ernst Prescher

AUTOMATIC SULFUR DIOXIDE DETERMINATION WITH A POLAROGRAPHIC-COULOMETRIC UNIT. *(Automatische Schwefeldioxid-Bestimmungen mit einem polarographisch-coulometrisch arbeitenden Geraet). Text in German. Wasser Luft Betrieb, 15(10):366-367, Oct. 1971. 7 refs.*

An automatically operating sulfur dioxide measuring unit based on the polarographic-coulometric method is described. The air sample is drawn into a diluted 1% sulfuric acid solution which is saturated with iodine. The solution flows through a combination of electrolytic cells. The solvent flow speed is one liter per week. The current flowing over the so-called indicator electrodes is proportional to the SO2 content of the sample. The presence of ozone, chlorine, ammonia, oxides of nitrogen and carbon monoxide in the air sample has no effect on the measurement. Hydrogen sulfide interferes with the measurement slightly. By insertion of an additional filter, the H2S interference can be avoided. From January to June 1970, comparative sulfur dioxide emission measurements in Berlin-Dahlem were taken with the Picoflux unit and the experimental unit. Both units were checked several times by means of a test gas with 1 mg SO2/cu m. Half hourly averages were obtained from the continuously recorded SO2 concentrations. Relatively high SO2 concentrations (between 0.254 mg SO2/cu m, the monthly average for January to 0.035 mg/cu m, the monthly average for June) were measured even in the outskirts. With the new unit, 10% higher values were measured than with the picoflux unit on the average. From parallel measurements of SO2 concentrations between 0.4 and 0.5 mg/cu m, a standard deviation of 0.03 mg SO2/cu m was obtained.

15877 APTIC NO. 33849

Leichnitz, Kurt

INFLUENCE OF PRESSURE AND TEMPERATURE ON THE INDICATION OF DRAEGER MULTI-GAS DETECTORS. *(Einfluss von Druck und Temperatur auf die Anzeige von Draeger-Roehrchen). Text in German. Draeger-Hefte, (280):15-22, April-June. 1971. 2 refs.*

The Draeger multi-gas detector can be used at pressures and temperatures other than those normally encountered. This is important for measurements which are carried out in high altitudes or in pressure chambers or for analysis of hot gases. The measurement method is identical with that under normal pressures. For the evaluation, however, the tubes have been calibrated under laboratory conditions, i.e., at 20 C and 760 torr (equals one atm). The reading is independent of the pressure. The pressure dependence of the volume is calculated with Boyle-Mariotte s law. The actual gas concentration is obtained from the reading and the stroke number of the pump. Between temperatures of 0 and 40 C the reading of Draeger tubes is almost unaffected by the temperature. They deviate only seven percent from the nominal value, which is still within the standard deviation determined for the Draeger tubes. If the test tubes are used for the analysis of hot gases, they are first cooled with A draeger hot air probe to temperatures between 0 and 40 C. Great care must be taken that the composition of the gas which is analyzed does not change during the cooling process.

15878 APTIC NO. 34067

Lindauer, George C. and A. W. Castleman, Jr.

INITIAL SIZE DISTRIBUTIONS OF AEROSOLS. *Nucl. Sci. Eng., 43(2):212-217, Feb. 1971. 9 refs.*

The use of digital computer programs to determine the size distribution of an aerosol as a function of time requires knowledge of the initial size distribution. The results are presented of an analytical investigation made to determine whether an aerosol produced as an instantaneous source approaches a self-preserving shape. For high number density aerosols, calculations indicate that the initial size distribution rapidly approaches a self-preserving shape which can be represented by a long-normal distribution with a standard geometric deviation between 1.34 and 1.40. This long-normal distribution is utilized to calculate a pseudo-initial particle size distribution for use as the initial condition in digital computer programs. Calculations were performed for plutonium dioxide and uranium dioxide. (Author abstract modified)

15879 APTIC NO. 33781

Malamud, M. Z. and I. P. Kolpakova

CERTAIN SUPPLEMENTS TO THE APPARATUS FOR DETERMINING CARBON MONOXIDE IN THE AIR. *(Nekotoryye dopolneniya k Priboru dlya opredeleniya okisi ugleroda v vozdukhe (POU)). Text in Russian. Gigiena i Sanit., 36(7):94-95, 1971.0*

Improvements made on the device for carbon monoxide determination in the air are described. They include an additional Bobrov bottle inserted before the air purifying system and a container with a tube at its bottom for expelling the air from the Bobrov bottle. A T junction with a valve is placed between the additional Bobrov bottle and the free end of one of the valves. The free end of the T junction is connected with a rubber tube leading to the microabsorbers. The Bobrov bottle siphons are provided with valves for adjusting the air flow introduced into the A and B systems. A rubber tube leading to the air purification device is applied on the intial Bobrov bottle. A two ML microburet is used for the titrations and the procedure is described.

15880 APTIC NO. 33340

Maly, Ernest

DETERMINATION OF TAR HYDROCARBONS IN THE ATMOSPHERE - III. *(Stanovenie dechtovych uhlovodikov vo vzduchu - III). Text in Czech. Pracovni Lekar. (Prague), 18(4):161-164, 1966. 15 refs.*

Identification of the 1,2,3,-4-dibenzpyrene spot on the paper chromatogram of high-temperature tar was carried out employing Whatman no. 4 filter paper impregnated with 10% petrolether paraffin oil solution and methanol saturated with paraffin oil as the ascending mobile phase. Quantitation of the compound was carried out by horizontal diameter spot measurement on the chromatogram. Simultaneous determination of 3,4-benzpyrene, 1,2,3,4-dibenzpyrene and other hydrocarbons is, therefore, possible without previous column chromatography. This method can be employed in determining airborne polycyclic hydrocarbons collected on filter paper regardless of the volume of air sampled.

15881 APTIC NO. 33402

Mamuro, Tetsuo

ANALYSES OF POLLUTANT ELEMENTS. *(Kogai busshitsu no genso bunseki). Text in Japanese. Genshiryoku Kogyo, 17(8):19-25, Aug. 1971. 14 refs.*

Mechanical analysis of metallic elements in suspended particulates in the air using radioactivation is discussed. Atomic absorption analysis and emission analysis are often used in measuring several heavy metals in the air. In early 1970, suspended dust particulates were collected for about a month at four locations of Osaka, at the low speed of 10 20 l/min. The dust particulates collected on a membrane filter of 4.7 cm diameter, 1.2 micron perforation diameter, and in approximately 100 cu m air were irradiated together with standard comparative material in the 5 MW atomic reactor of Kyoto Univ. Irradiation time was five minutes and one hour. Measurements were taken with two minutes and 15 min intervals after irradiation was completed. The output of the wave-height analyser was rapidly transferred to a magnetic tape. For the material irradiated for one hour, three cooling intervals of 2-3 days, 6-7 days, and 15 days were given before measurements were taken. The results of these measurements seemed to suggest various types of definite correlation which might lead to clues for characteristics of air pollution patterns. Graphs are presented to show these patterns.

15882 APTIC NO. 33707

Mamuro, Tetsuo, Yatsuka Matuda, Akira Mizohata, Takayuki Takeuchi, and Akira Fujita

NEUTRON ACTIVATION ANALYSIS OF AIRBORNE DUST. *(Annu. Rep. Radiat. Cent. Osaka Prefect.), vol. 11:1-13, 1970. 7 refs.*

The concentrations of over 30 elements of airborne dust were determined by instrumental neutron activation analysis using gamma-ray spectrometry and a data processing system. Airborne dust samples from Osaka and Sakai Cities were collected on membrane filters continuously for February March and June - July. The preparation of materials for irradiation; irradiation and cooling times; radionuclides and their gamma-ray energy used in determination; and technical improvement of the technique are presented in general, the measured values of the elements were one thousandth or less of the maximum permissible concentrations in working areas. Seasonal differences within measured values for the elements were not significant except for sodium, chlorine, scandium, arsenic, strontium, and potassium. The measurement of atmospheric elements, regardless of pollution potential, provide an effective aid to understanding the complex structure of air pollution.

15883 APTIC NO. 33496

Manalan, David A. and Roger R. A. Morton

ANALYSIS OF PARTICULATE CONTAMINATION BY THE IIMC PARTICLE MEASUREMENT COMPUTER SYSTEM. *Anal. Instrum., vol. 8:1-7, 1970. 4 refs. (Presented at the Instrumentation Society of America, Analysis Instrumentation Symposium, Annual, 16th, Pittsburgh, Pa., May 25-27, Paper IV-2.)*

A general overview of particle measurements and their physical interpretations was made. Of all the measurement techniques used for analysis of small particles, the microscope is still regarded as the most useful and versatile. The IIMC Particle Measurement Computer System can automatically determine the actual boundary of a particle regardless of grey value or variations in background illumination. A second type of threshold allows selection of particles of a given grey scale value without distorting their horizontal chord dimension. Finally, a manual mode was provided for doing analysis of different fractions of multiphase particles. The IIMC also provides refined logic that is not confused by reentrant particles, particles with holes, or long twisting particles. The logic further discriminates by counting particles which intercept the edge of the field only if they are at the top or right-hand side. Thus, a statistically valid count is always made. Measurements that can be made with the IIMC are the individual projected length, the individual area excluding holes, the individual Feret s diameter, and the individual longest dimension. Shape factors may be immediately determined by the ratio of the longest dimension to the square root of the area. Impingers and direct capture on a filter structure are generally best for survey work where it is desired to sample many liters of air. Membrane type filters can be used directly with microscopic examination in incident illumination.

15884 APTIC NO. 33899

Mokranjac, Momcilo and Dusan Jovanovic

POLAROGRAPHIC DETERMINATION OF LEAD IN THE ATMOSPHERE. *(Prilog pitanju polarografskog odredivanja olova u vazduhu). Text in Serbo-Croatian. Acta Pharm. Jugoslav. vol. 4:52-61, 1954. 10 refs.*

A polarographic method for the determination of lead in the air is described which purportedly eliminates the problem of the presence in air of small quantities of insufficiently mineralized organic matter, and in some cases, the presence in the air of considerable quantities of iron, both of which interfer with the polarographic determination of lead. The method proposed passes 30 to 60 l air through an impinger containing diluted nitric acid. The acid is subsequently evaporated until dry. Five to ten drops of a one to one mixture of nitric and perchloric acid are added to the residue, the vessel is covered with a watch glass and evaporated until dry at 200 C. The residue must be white to eliminate iron completely, if it is not, the process if repeated. The residue is dissolved in a solution of 21.008 g citric acid in 200 ml n sodium hydroxide and brought up to one l. Fifty-four ml of this solution are brought to 100 ml with 0.1 n hydrochloric acid and mixed with 4.0 ml of hydrated cadmium chloride in 500 ml water. This is the basic solution which, before polarographic analysis, is transferred to a receptacle for electrolysis and hydrogen passed through it for 15 minutes. Polarography is performed at between -0.4 and -0.8 V.

15885 APTIC NO. 33373

Naito, Keikichi

LIDAR FOR AIR POLLUTION MEASUREMENT. *(Taiki osen kansoku-yo raida). Text in Japanese. Kisho Kenkyusho Nyusu (Meteorol. Res. Inst. News), no. 4:4-5, April 1971.*

Lidar can be utilized to detect inversion layers, mingled layers, and the interface of sea and land breezes, volume distributions of suspended particulates, and dispersion patterns of high stack smokes. At present, ruby crystals are used as elements causing oscillation. Ruby crystals are stable and durable but have the disadvantage of yielding slow pulse repeats (once in 5 sec). Faster pulse repeats and an energy output of a certain degree are desirable. One of more recently developed laser oscillation elements is YAG, a crystal of yttrium, aluminum and garnet, which creates a 1.06 micron wave length and a pulse repeat of approximately 1000 Hz. The wave length 1.06 micron presents a problem in photoelectric conversion, which can be solved if the wave length can be changed to 0.53 micron by using certain crystals with nonlinear transmission of light. This laser refraction is called SHG (Second Harmonics Generation), and some of practical crystals with excellent SHG are KDP and BNN. For the time being, the combination of SHG and YAG seems to be the best solution for air pollution lidar.

15886 APTIC NO. 33993

Newkirk, T. E. and G. R. Yourt

GRAVIMETRIC DUST SAMPLING. *Can. Mining J., 92(10):55-57, Oct. 1971. 10 refs.*

An intensive study of gravimetric sampling of total respirable siliceous dust was undertaken to determine the criteria which will enable the Mines Accident Prevention Association to recommend to its members the instrumentation and procedures that should be used at hazardous mining operations. Another objective of the project was to develop a more effective and reliable method to measure concentrations of aluminum powder. The development and improvement of konimetry are reviewed, as well as the correlation between sampling methods and threshold limit values.

15887 APTIC NO. 34284

Nigmatullina, K. S.

OBSERVATION OF TOTAL OZONE CONTENT AND LIGHT EXTINCTION BY AEROSOLS IN THE ATMOSPHERE. *(Nablyudeniye obshchego soderzhaniya ozona i aerozol nogo oslableniya sveta v atmosfere). Text in Russian. Meteorol. i Gidrol., no. 8:36-42, 1971. 13 refs.*

The total ozone content and the light extinction by an aerosol can be determined from the extinction of solor radiation in the visible part of the spectrum. The relationship was derived for the dependance of the extinction coefficient delta on wavelength, with parameters a and b characterizing the magnitude and character of aerosol extinction. The coefficients a and b are determined simultaneously with total ozone concentration. Ozone content calculated from the formula agreed well with measured ozone concentration. The proposed method is simple and requires no complicated apparatus.

15888 APTIC NO. 34014

Oka, Shotaro

MEASUREMENTS AND APPARATUS FOR AIR POLLUTANTS. *(Taiki osen busshitsu no sokuteiho narabi ni kiki). Text in Japanese. Preprint, Japan Industrial Newspaper Co., Tokyo, 9p, 1971. (Presented at the Seminar on Air Pollution Control, Tokyo, Japan, Sept. 1971.)*

Various air pollution measurement equipment are reviewed by a table. Analysis methods of carbon monoxide, sulfur oxides, and nitrogen oxides are discussed and other pollutants such as oxidants, hydrocarbons, oxides, sulfides, nitrogen compounds, and halogen compounds are mentioned. As an effective analysis method, the non-dispersion infrared absorption spectrometry is explained. The batch electroconductivity analyzer, which is often used in Japan for analyses of SOx, is explained with the use of diagrams. For continuous monitoring of relatively high concentration of SOx, such as emission gases from thermal power plant, non dispersion infrared absorption spectrometry is recommended. For analyses of NOx, non-dispersion infrared, ultraviolet absorption method and colorimetry are recommended. The Saltzman method and the chemiluminescent method are explained as effective analytical methods of NOx by diagrams.

15889 APTIC NO. 34038

Okada, Takashi, Kazuko Itoh, and Susumu Kitani

DETERMINATION OF SIZE DISTRIBUTION OF SMALL AEROSOL PARTICLES BY LIGHT-SCATTERING METHOD. *J. Colloid Interface Sci., 37(2):430-436, Oct. 1971. 13 refs.*

The size distribution of small aerosol particles was determined by measuring the intensity of scattered light with a photometer at three angles for a fixed wavelength of the incident beam. A pair of relative intensities of scattered light at determined angles were calculated as a function of the modal size and logarithmic standard deviation. Based on charts of the relative intensities of scattered light, particle sizes of aerosols less than 0.3 micron in modal diameter could be determined. Experimental results for dioctyl phthalate aerosol obtained from theoretical charts were compared with those from the polarization ratio method. The parameters for the characterization of aerosol particle size were in good agreement. (Author abstract modified)

15890 APTIC NO. 33562

Olin, John G., Gilmore J. Sem, and Richard P. Trautner

AIR-QUALITY MONITORING OF PARTICLE MASS CONCENTRATION WITH A PIEZOELECTRIC PARTICLE MICROBALANCE. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 31p., 1971. 3 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 64th, Atlantic City, N. J., June 27-July 2, 1971, Paper 71-1.)*

The particle mass monitor is specifically designed for continuous air quality monitoring and effectively replaces the filter-weighing procedure with an automatic instrument. The sensor consists of an oscillating quartz crystal. An electrostatic precipitator deposits the particles with nearly 100% collection efficiency onto the surface of the vibrating crystal. Trace amounts of a gas are emitted by a constant-temperature permeation tube into the inlet aerosol stream to make the particles firmly adhere to the crystal surface. The background error caused by this trace gas is negligible. The resonance frequency of the crystal decreases linearly with the mass of the particulate deposition and is monitored and recorded with a digital counter and printer. The time rate-of-change of frequency is proportional to particle mass concentration. Simultaneous measurements show good comparison of the particle mass monitor with the parallel membrane filter, good reproducibility, an upper particle size limit as high as 50 micron for the aerosol tested, and a time response of 30 sec or less. Measurements with a high-volume sampler were approximately a factor of two higher than those obtained with the parallel filter and particle mass monitor, probably because the high-volume sampler collected a significant number of very large particles in the 50 to 200 micron range. (Author abstract modified)

15891 APTIC NO. 33535

Overbeck, E. M. and K. B. Thayer

PARTICULATE SAMPLING. *Preprint, American Society of Mechanical Engineers, New York; 8p., 1970. 2 refs. (Presented at the Petroleum Mechanical Engineering and Pressure Vessels and Piping Conference, Denver, Colo., Sept. 13-17, 1970, Paper 70-Pet-1.)*

A review of the reasons for, and methods of, particulate sampling is presented. In order to select and size equipment, it is necessary to know both the quantity and particle size range of the dust being emitted. The amount of dust going to the atmosphere will determine the process requirement for disposition of collected material and also contribute to the economic evaluation of the installation. Dry mechanical collectors are not generally efficient for particles 10 micron and smaller. The simplest dry mechanical collector is the single large diameter cyclone. Wet collectors, as the name implies, use a liquid as a collecting medium. They can be of the centrifugal, impingement, or packed bed type. Area sampling refers to the testing of a total plant. It requires a high volume of air, generally a minimum of 1200 cu ft/test. Visual sampling is a check of the equivalent opacity of a stack or flare. Stack sampling is the taking of a measured volume of air, usually around 50 cu ft, from a stream containing gases and particulate matter. A review of field problems is included along with specific design problems based on field data obtained.

15892 APTIC NO. 33913

Owen, L. E., J. C. Delaney, and C. M. Neff

THE SPECTROCHEMICAL ANALYSIS OF AIR-BORNE DUSTS FOR BERYLLIUM. *Am. Ind. Hyg. Assoc. Quart., 12(3):112-114, Sept. 1951. 6 refs.*

A spectrochemical technique derived from the porous cup technique and adapted to industrial hygiene problems involving dusts and fumes of beryllium and its compounds is described. Two main types of samples are prepared for spectrographic analysis. In the first, a measured quantity of air is drawn through a 1-in. diameter disc of Whatman no. 41 filter paper; the filter paper with its dust is submitted for spectrographic analysis. The second type is also based upon dust collections from air but utilizes electrostatic precipitation. In the analytical procedure, filter papers are placed in a crucible and ashed. After the crucible cools, 2 ml of concentrated hydrochloric acid are added. About 2.5 ml of sulfuric acid are then added to the crucible which is fumed until reduced to a volume of about 0.5 ml. The beryllium is completely dissolved by this time. The solution is then transferred to a flask containing 100 lambda of a 0.1% solution of molybdenum, and the solutions excited in porous cup electrodes. An exposure time of 3 min was used. Spectra were photographed in the 2480-3700 A region. The precision of the method on duplicate samples is about 3.5%. The limiting sensitivity was not determined. Results indicate that the method justifies the continuation of the monitoring program at Oak Ridge.

15893 APTIC NO. 33912

Peterson, George E., George A. Welford, and John H. Harley

SPECTROGRAPHIC MICRODETERMINATION OF BERYLLIUM IN AIR DUST SAMPLES. *Anal. Chem., 22(9):1197-1200, Sept. 1950. 9 refs. (Presented at the Conference on Analytical Chemistry and Applied Spectroscopy, American Chemical Society, Pittsburgh Section, and Spectroscopy Society of Pittsburgh, Pittsburgh, Pa. Feb. 16, 1950.)*

A spectrographic method for determining beryllium in air dust samples collected on filter papers covers from 0.05-200 micrograms of beryllium per sample. The filter paper is wet or dry-ashed, treated with hydrofluoric and sulfuric acids, and taken to dryness. After solution in hydrochloric acid, iron, aluminum, and other metals are removed by precipitation with oxine in acetate-buffered solution. The excess oxine is removed with chloroform, and the beryllium is precipitated as hydroxide, with 2.5 mg aluminum as a carrier. The hydroxide is dissolved in sulfuric acid and the volume brought to 1 ml of 1 to 7 acid. Aliquots of this solution are used for the spectrographic analysis. A 0.05-ml portion is transferred to each of three cupped, waterproofed carbon electrodes containing about 45 mg of sodium chloride as spectrographic buffer and carrier. Excitation is with direct-current arc at 10 amperes for 2 min. The average triplicate density ratios of Be 2348/Al 2367 or Be 2650/Al 2367 is used as the analytical curve function. Check analyses show a relative error of plus or minus 20%, except at the extreme lower range, and overall recovery of the chemical procedure is 90% of the beryllium content. (Author abstract modified)

15894 APTIC NO. 33355

Pierce, James O. and Raymond J. Collins

CALIBRATION OF AN INFRARED ANALYZER FOR CONTINUOUS MEASUREMENT OF CARBON MONOXIDE. *Am. Ind. Hyg. Assoc. J., 32(7):457-462, July 1971.*

A relatively inexpensive and standardized method of calibration is presented for an infrared analyzer. The theory and principle of operation and the scheme for setting up and calibrating the response of the instrument to differing concentrations of carbon monoxide are examined.

15895 APTIC NO. 33731

Pierce, J. O. and J. H. Meyer

SAMPLING AND ANALYSIS CONSIDERATIONS IN EVALUATION LEVELS OF ATMOSPHERIC LEAD. *Atmos. Environ., 5(9):811-813, 1971. 5 refs.*

Experiments were conducted to ascertain the accuracy and precision with which the total quantities of lead could be determined when only segments of the membrane filters used to collect the samples are employed for the analyses. A total of 160 segments from 36 filters were analyzed by the atomic absorption spectrophotometry and wet chemical (dithizone) methods. The estimated range of the quantities of lead per filter was from 274 to 4168 micrograms. Statistical analysis of the data determined that the precision was inconsistent from one filter to the next, and could lead to 95% confidence limits as narrow as 97-103% or as wide as 67-150%, depending on whether the lower or upper 95% limit of the estimated variance was applied. Where conclusions have to be drawn from a single filter or from a limited number of filters, the whole filter membrane rather than segments thereof should be analyzed. The relative accuracy of the atomic absorption method was better than that of the wet chemical method. (Author abstract modified)

15896 APTIC NO. 34144

Pillay, K. K. S., C. C. Thomas, Jr., and C. M. Hyche

NEUTRON ACTIVATION ANALYSIS OF INORGANIC CONSTITUENTS OF AIRBORNE PARTICULATES. *Nuclear Technol., 10(2):224-231, Feb. 1971. 17 refs.*

Applications of neutron activation analysis to routine monitoring of airborne inorganic pollutants were investigated. Thy use of several filter media were studied and two suitable filter materials (Millipore EHWPO4700 and Dexter X-1215) were chosen for this investigation. An air sampling procedure was used to obtain several representative samples during the period of monitoring. A non-isolative neutron activation analysis procedure involving multiple neutron irradiation and high resolution gamma ray spectrometry was used to determine the concentrations of 16 elements found in the airborne particulates in samples collected over a 1-year period from the Buffalo, New York, area. Differences from previous studies are due to higher filter efficiency and the particular local industrial workup. Results indicate that neutron activation analysis competes well with other methods of analyzing the elemental composition of air pollutants. (Author abstract modified)

15897 APTIC NO. 33770

Rathgeber, Ferdinand

AIR POLLUTION MONITORING UNITS. *(Kontrollgeraete fuer die Luftverunreinigung). Text in German. Wasser Luft Betrieb, 15(10):357-362, Oct. 1971. 14 refs.*

Infrared and ultra-red analyzers, heat conductivity analyzers, units operating on the principle of UV absorption, electrochemical analyzers, and colorimetric analyzers are described for air pollution monitoring. With infrared analyzers, the sample gas is passed through a chamber in the irradiation path. In a second chamber located in a secondirradiation path, nitrogen absorbs no infrared radiation. With ultra-red gas analyzers, the ultra-red radiation is divided into two branches with counter-phase modulation but the same intensity. The two branches pass alternately the analyzer and the comparative unit and then enter a double-layered receiver which contains the gas component to be measured. The ultra-red analyzer is particularly suitable for measuring carbon monoxide and sulfur dioxide in flue gases. Heat conductivity gas analyzers make use of the different heat conductance of gases; they are primarily used for the control of combustion processes. Analyzers based on UV absorption are simple in design, have a high sensitivity in the ppm and per cent range. The gas sample passes through a quartz glass cuvette. The radiation of a mercury lamp is bundled by a condenser and transmitted to the light receiver. Electrochemical analyzers are particularly suitable for emission monitoring. Various types are available. One is based on the change of the silver ion concentration the other on the change of the electric conductivity.

15898 APTIC NO. 34215

Raynor, Gilbert S.

ENTRANCE EFFICIENCY OF A VANE-MOUNTED FILTER SAMPLER AT A 45-DEGREE ANGLE TO THE WIND. *Preprint, Brookhaven National Lab., Upton, N. Y., 15p., 1971 (?). 7 refs.*

Wind tunnel experiments were conducted to test an earlier prediction by an empirical model that the entrance efficiency of an orifice at a 45-deg angle to the air stream should be unity and should not vary with wind speed, particle size, or flow rate. Tests were made with six and 20-micron diameter particles at wind speeds from 0.75 to 7.0 m/sec and flow rates of 12.7 and 25.4 l/min. Both fixed and vane-mounted filter holders were used as test orifices. Results confirmed that entrance efficiency at the 45-deg angle is relatively constant over the range of experimental conditions in contrast to results at other angles. A vane-mounted filter sampler with the entrance at a 45-deg angle is described and suggested for interim use until a device for isokinetic sampling in a fluctuating wind is perfected. (Author abstract modified)

15899 APTIC NO. 33926

Rechmenskiy, S.

BACTERIAL SAMPLERS. *In: Great Medical Encyclopedia. Vol. 3, 2nd ed., Moscow, 1957. 9 refs. Translated from Russian by Eldon E. Ewing and John C. Malinowski. Fort Detrick, Frederick Md., Technical Information Div. and Fort Detrick, Frederick, Md., SO Div., 15 p., July 1, 1968.*

NTIS, DDC: AD 673306

Two types of devices exist for the detection of microorganisms. For catching large bacterial particles or droplets that make up the suspended matter in the air, one can use the sedimentation method, known as the Koch dish method. The large bacterial particles settle from the air and enter the surface of a close grained medium in the open dishes. The method is simple, but it is impossible to determine the concentration of microorganisms in the air. The second device is the aspiration type and included the Well s air centrifuge with the A. I. Shafir modification, the Bourdiilon, Lidwell, and Thomas slit sampler with the A. Krotov modification, and the S. S. Rechmenskiy air centrifuge. The Wells-Shafir air centrifuge consists of a metal container, and electric motor, and a housing. Under centrifugal force, the particles suspended in the air precipitate onto the surface of the nutritious medium and are fixed there. The slit sampler is a wide cylinder which is covered from above by a detachable cover; below, on a rotating table, is an open dish with a close-grained nutritious medium. Passing through the aperture with a great linear velocity, the air stream strikes against the surface of the medium in the rotating dish and sows it with microflora. The Rechmenskiy air centrifuge consists of a plastic rotating disk fastened to the fan motor shaft. As a result of the rotation of the disk, the air enters the opening of the pipes and produces an impact effect. The bacterial dust contained in the stream of air adheres to the surface of the cellophane sheets in the pipes and is fixed there.

15900 APTIC NO. 33660

Riedel, Hans-Guenther and Herbert Mohry

DETERMINATION AND ELIMINATION OF AIR POLLUTION WITH A SPECIAL VIEW OF THE MEASUREMENTS IN INDUSTRIAL AREAS AND THEIR ECONOMIC EFFECT. *(Die Erfassung und Behebung von Luftverunreinigungen unter besonderer Beruecksichtigung von Messungen in Industriegebieten und deren wirtschaftliche Auswirkung). Text in German. Energie. Tech., 21(9):419-424, Sept. 1971. 11 refs. (Presented at the Weltenergiekonferenz, 8th, Bucharest, Rumania, 1971.)*

Enormous amounts of power are required in highly industrial East Germany. Since most of the power plants are operated with coal, sulfur compounds are at the top of the list of emissions in the two major East German industrial centers. Maximum allowable emission concentrations have been limited to 0.5 mg/cu m for sulfur dioxide and non-toxic dust, 0.15 mg/cu m for soot, 6.0 mg/cu m for carbon monoxide, and 0.008 mg/cu m for hydrogen sulfide. A battery-powered unit is available for the sampling and analysis of SO2; it comprises a low voltage membrane pump, a flowmeter, and 30 absorbers. The battery operates for 40 hours. Ten liters of air are drawn through a tetrachloromercurate solution at a speed of 60 l/hr. Sampling time is 10 minutes. Several other methods are mentioned. In one procedure, the amount of SO2 present is determined by a change in the ionization current.

15901 APTIC NO. 34202

Rybakov, B. N. and L. A. Sinyagovskaya

ON THE DETERMINATION OF CORROSIVELY ACTIVE GASES IN THE ATMOSPHERE BY THE LINEAR-COLORISTIC METHOD. *(Opredeleniye korrozionno-aktivnykh gazov v atmosfere lineyno-koloristicheskim metodom). Text in Russian. Zashch. Metall. (Moscow), 5(6):716-718, 1969. 4 refs.*

A method for determination of low concentrations of corrosive gases is described, in which the contaminated air is aspirated into a column of indicator powder, which registers the presence of a corrosive component by a color change. With an increase in volume of analyzed air the length of colored indicator column increases. This enables detection of small amounts of corrosively active gases. The sensitivities of indicator tubes in determining sulfur dioxide, nitrogen oxides, hydrogen sulfide, ammonia, and chlorine, calculated from experimental data, are 1.4-2.0 times 10,000 mg/mm. Some limitations of the method are discussed.

15902 APTIC NO. 34047

Saikado, Hideki

STUDY AND COUNTERMEASURES OF BAD ODORS FROM OIL REFINERY. *(Seiyusho shuuki no chosa to taisaku). Text in Japanese. Sekiyu Gakkai-shi (J. Japan Petroleum Inst., Tokyo), 14(10):797-801, Oct. 1971. 2 refs.*

Intensities of odors at their sources were studied in terms of odor pollution. Speed of odor emission was introduced to express odors quantitatively. A perceptible limit of the smell of gas in one cu ft was one odor unit. Speed of odor emission and unit odor per hour were calculated by applying the law of Weber Fechner or by analyzing odorous gas composition and determining the perceptible limit of concentration of each compound in the gas. The allowable limit of odor was studied by developing a formula in which odor was assumed to spread only to leeward, not in all directions. Distance from the emission source was also considered relative to intensity of odor. Sources of bad odors within a refinery plant and their intensities were surveyed. Several countermeasures for prevention or reduction of bad odor were reported.

15903 APTIC NO. 34005

Sakai, Kaoru

ATOMIC ABSORPTION SPECTROPHOTOMETRY -- APPLICATION FOR POLLUTANT ANALYSES. *(Genshi kyuko bunseki -- kogai bunseki e no oyo). Text in Japanese. Preprint, Japan Society for Analytical Chemistry, 78p., 1971. 7 refs. (Presented at the Japan Society for Analytical Chemistry Seminar, Toyama City, Japan, 1971.)*

The principles, characteristics, and limitations of atomic absorption spectrophotometry and various kinds of spectrophotometry are discussed. The structure and mechanism of various photometric systems, various lamps, various burner units, fluorescent spectrophotometry, various obstructions in these methods and method of elimination, various data and analytical methods of environmental pollution are surveyed. Interferences, of atomic absorption spectrophotometry include: ionization, flame absorption, light dispersion, viscosity of test materials, chemical interferences, negative and positive on influences, and the influences of organic catalysts. Some methods of elimination of interferring elements are: catalytic extraction by pyrrolidine dithiocarbamine acid ammonium, or methylisoptilketone, or diethylthiocarbamine acid natrium; reverse extraction by hydrogen chloride; separation by ion exchange resin or paper, precipitation, filtering, centrifugal separation, electrolysis, chromatography, separation, gasification separation, burning to ashes, use of deterrant such as positive ions of strontium or lanthanum, suitable negative ion addition, or chemical reagent additives.

15904 APTIC NO. 33518

Saks, O. V.

DESIGN OF A DYNAMIC CAPACITOR FOR ATMOSPHERIC ION COUNTERS. *Hydrometeorological Service of the USSR, Tr. Vses. Nauch. Meteorol. Soveshuh., 1962, vol. 9. 5 refs. Translated from Russian in: Instruments and Methods for Meteorological Observations, p. 324- 327, 1966, by A. Wald, Israel Program for Scientific Translations, Jerusalem.*

NTIS: TT 65-50004

Several versions of a dynamic capacitor of the membrane and vibrating reed types were designed. The best proved to be the capacitor with a corrugated bronze membrane. A small steel disk serving as an armature is welded centrally at one side of the membrane, while at the other side a brass plate is welded to serve as a vibrating electrode. The armature, located in an alternating magnetic field, together with the electrode imparts vibratory motion to the membrane. A polarized electromagnet is employed as an excitation source. The drift of contact voltage is sufficiently low to permit its use with recording devices for aspiration-type ion counters. The counter operates in cycles when high-sensitivity electrometers are used and cycles are no longer than one or two minutes. During such a short interval, the zero drift is negligible. At the beginning of each cycle it is possible to introduce corrections for zero point automatically or to record the zero reading. Dynamic capacitors can be employed in dyanamic electrometers for a frequency band of 50-600 cps, since the modulation coefficient is rather high within this range. It is not suitable to operate the dyanmic capacitor at the natural frequency of the moving system of the instrument, because of sudden variations in phase with changes in the generator frequency. The working frequencies above the natural frequency of the dynamic capcitor can only be used when it is impossible to achieve a quick response of the recorder at lower frequencies.

15905 APTIC NO. 33452

Sandt, Walter A. Van, Vincent C. Santomassino, Robert P. Rumble, and Oran M. Barlow

DIRECT-READING BERYLLIUM SPECTROGRAPH. *Am. Ind. Hyg. Assoc. J., 23(3):203-213, May-June 1962. (Presented at the American Industrial Hygiene Association, Annual Meeting, 22nd, Detroit, Mich., April 1961.)*

A direct-reading emission spectrograph for the quantitative determination of beryllium on 1-in. diameter filter paper discs was developed to relieve the workload in industrial hygiene chemistry laboratories. The instrument uses a grating monochromator as its basic unit. Operation of the spectrograph is automatic; the amount of beryllium on the filter paper is read directly from a meter. The filter paper sample discs are used with specially designed high-purity graphite sources. Spark excitation of the sample is by a small spark source. The instrument detects beryllium in concentrations from 0.01 to 19 micrograms. (Author abstract modified)

15906 APTIC NO. 33349

Sano, I.

CHEMISTRY OF ODOR--WITH PARTICULAR REFERENCE TO THE RECOGNITION THRESHOLD DETERMINATION. *(Nioi no kagaku--ikichi o chushin to shite). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 9(3),1-6, Aug. 1971. 4 refs.*

Recent studies on the organoleptic determination of the thresholds of a number of odorous chemicals are described. The chemicals were presented to a trained panel in a test room, as well as to an untrained panel under the open sky. Sulfur-containing compounds have low thresholds on the order of parts/billion; t-butyl mercaptan exhibits a much higher threshold than would be expected; and thiophene varies considerably from test to test. Molecular chain branching might lead to enchanced odor intensity. Depending on the nature and number of the radical added, substitution on the benzene ring reduces the threshold by as much as a thousandfold. (Author abstract modified)

15907 APTIC NO. 33577

Sawaya, Tsugio

ODOR MEASURING METHODS. *(Shuki no sokuteiho). Text in Japanese. Kuki Seijo (Clean Air - J. Japan Air Cleaning Assoc., Tokyo), 9(3):7-12, Aug. 1971. 9 refs.*

Methods of measuring odor producing elements in waste water from fishmeal plants or slaughter houses depends on the chemical element in the water. When the element is volatile aliphatic acid, a given amount, v ml, is taken from the total V ml. Phenolphthalein indicator is added to v. The amount of a standard solution of caustic soda (NaOH) added to the solution producing a change of color to pink is designated as A; 5-10 ml of 20% formalin solution is added to the solution causing the color to fade. The amount of NaOH producing a change to pink for the second time is B. A dry run is given to V amount of liquid and the amount of loss is designated as a. The volatile aliphatic acid (CH3COOH) in the test material (in mg) then may be calculated by: 60N multiplied by (A + B a) and multiplied by V which is divided by v where N is NAOH concentration. Amines in the test water (CH3NH2) may be obtained in mg by: 31N multiplied by (B-a) multiplied by V which is divided by v. When the test material is alkaline, bromothymol blue indicator is added to v ml of the wastewater and HCl standard solution is added until it turns yellow. The amount of HCl is C. Separately v ml of the test water is taken and 5-10 ml of 20% formalin solution and phenolphthalein are added. The amount of NaOH standard solution that changes the material into pink is D. The amount of loss of NaOH by a dry run with v amount of liquid is d. The total weight of aliphatic acid may be obtained by 60N (D-d) multiplied by V divided by v. The weight of amines may be obtained by 31FC multiplied by V divided by v. F is HCl standard solution concentration. A method of selecting an olfactory panel and the test method using the panel, methods of producing low-concentration gases, and actual cases of fishmeal plants are discussed briefly.

15908 APTIC NO. 33502

Schachter, M. M.

APPARATUS FOR PRODUCING THREE-DIMENSIONAL RECORDINGS OF FLUORESCENCE SPECTRA. *(National Aeronautics and Space Administration, Washington, D. C.) U. S. Pat. 3,302,023. 5p., Jan. 31, 1967. 4 refs. (Appl. Feb. 20, 1964, 8 claims).*

An invention is described which pertains to a spectrophotofluorometer for measuring the fluorescence spectra of trace amounts of carcinogenic and non-carcinogenic hydrocarbons, as well as the display of the spectra on a three-dimensional graph. The failure of prior methods to provide for a three-dimensional display method of viewing the various parameters required that an investigator analyze a multitude of complex graphs to determine the properties of the compounds being investigated, either for comparison purposes or for obtaining specific information. Many hydrocarbons are quite similar and only by a thorough investigation of the graphs can the differences be distinguished. An electrical signal is obtained from the excitation monochromator of the spectrophotofluorometer, which is proportional to the wavelength being passed by the manochromator, and connected to the vertical deflection plates of an oscilloscope. A second electrical signal is obtained from the emission monochromator, which is also proportional to the wavelength of the signal passed by the monochromator, and is connected to the horizontal deflection plates of the oscilloscope. A third electrical signal is obtained from the photomultiplier tube, which detects the intensity of the emission spectra, and is connected to a trigger amplifier and oscillator which in turn controls the intensity of the beam of the cathode ray oscilloscope. Both the excitation and the emission monochromators are driven by servomotors having servopotentiometers which generate electrical signals proportional to the location of the respective monochromator dispersion gratings. The location of the gratings determines the wavelength of the light passed by the monochromators.

15909 APTIC NO. 33621

Schrowang, Horst

ELECTRICAL ENGINEERING IN THE FIELD OF HEATER AND AIR CONDITIONER CONSTRUCTION *(Elektrotechnik fuer Heizungs- und Lueftungsbauer). Text in German. Sanit. und Heizungstech., 36(9):690-694, Sept 1971.*

For flue gas monitoring of heaters, the measurement of the carbon dioxide concentration is of great interest. A method is described which permits continuous CO2 measurement. It is based on the principle of measuring the heat conductivity. The carbon dioxide CO2 has a considerably lower heat conductivity than the other components of the waste (oxygen, nitrogen, carbon monoxide). With increasing CO2 content in the waste gas, the general heat conductivity of the waste gas drops. The measuring unit comprises four chambers containing platinum wires heated to 100 C. The four platinum wires form the four resistors of the Wheatstone bridge. After leaving the CO2 measuring unit, the waste gas from heaters is usually passed through a CO and hydrogen measuring unit. As soon as the waste gas air mixture contacts a resistor, the CO H2 mixture contained in the flue gas burns by catalysis. Through this process the platinum-iridium wire is heated in proportion to the CO and H2 content. A pump is used for drawing the waste gas sample and the control air through the measuring unit

15910 APTIC NO. 33795

Sisson, William

NOMOGRAM DETERMINES WEIGHT OF DRY FLUE GASES, HEAT LOSS AND EXCESS AIR. *Power Eng., 75(10):55, Oct. 1971.*

A nomogram is presented for determining weight of dry flue gases, heat loss, and excess following Orsat analysis of flue-gas composition and determination of the weight of carbon burned/pound of coal fired. Use of the nomogram is illustrated for the case of a flue gas containing 12% carbon dioxide, 0.6% carbon monoxide, 4.0% oxygen, and 83.4% nitrogen.

15911 APTIC NO. 33728

Stevens, D. C.

AN ASSESSMENT OF THE OSCILLATING FIBRE MICROBALANCE OF PATASHNICK AND HEMENWAY. *Aerosol Sci., 2(3):315-324, Aug. 1971. 2 refs.*

The performance of an oscillating fiber microbalance, consisting of an electrostatically driven carbon fiber clamped at one end, was investigated. A change in resonance frequency is observed when a load is attached to the free end of the fiber. A method of theoretically deriving the load-frequency curve is presented which is probably as accurate as a direct calibration using spherical particles of known density. A carbon fiber about one cm in length can be used to weigh particles in the range of 10 to the minus seventh power to five times 10 to the minus ninth power grams to an accuracy of about plus or minus 10%. The use of the balance is illustrated by measurement of the mass of grains of lycopodium spores and ragweed pollen. The density of lycopodium spores was about 0.8 g/ml and of ragweed pollen about 0.5 g/ml. (Author abstract modified)

15912 APTIC NO. 33943

Stevens, D. C. and R. F. Hounam

A FINE GLASS FIBRE PAPER FOR AIR SAMPLING. *Ann. Occupational Hyg., vol. 3:58-63, 1961. 4 refs.*

The advantages are described of a thin, low-density paper of very fine glass fibers that combines a low resistance to airflow with high collection efficiency for aerosols. The rate of increase in the resistance of the glass fiber paper is less rapid than that of cellulose papers. As a consequence of the high filtration efficiency and uniform texture of the paper, a very high proportion of the dust particles are collected on its front surface so that no significant absorption of alpha particles occurs. The elimination of the correction factor is equivalent to sampling at about 50% more air. The weight of the glass fiber paper is only 5 mg/sq cm against 13 mg/sq cm for the cellulose paper, and seems to be unaffected at a temperature of 500 C; however, at 700 C melting occurs. Cellulose papers char at temperatures above 200 C. Where chemical treatment of the collected dust is required, separation of an element is no more difficult than with conventional filter papers. Because the sampled dust is collected on the front surface of the paper, and since the surface is smooth and the fibers fine, many dusts can be examined directly under the microscope. A disadvantage of the glass fiber paper is its flimsiness, requiring greater care in handling than ordinary cellulose papers.

15913 APTIC NO. 33886

Stitt, Fred and Yoshio Tomimatsu

SENSITIZED PAPER FOR ESTIMATION OF MERCURY VAPOR. *Anal. Chem., 23(8):1098-1101, Aug. 1951. 7 refs. (Presented at the American Chemical Society, 115th Meeting, San Francisco, Calif., March 27-April 1, 1949.)*

In the course of developing a portable instrument for measuring small amounts of ethylene in air by use of hot mercuric oxide as an oxidizing agent, sensitized paper suitable for detecting and estimating mercury vapor was studied. A paper both uniform and reproducible (plus or minus 5%) in its response to mercury vapor and relatively insensitive to temperature was prepared by a method which impregnates the paper with only selenium as the reactive material. Preparation of the paper involved soaking it in potassium selenocyanate solution, draining, and exposing it to a hydrogen chloride atmosphere. The quantity of reactive material per unit area of paper is easily controlled by adjusting the concentration of selenocyanate. The properties of this paper were compared with those of selenium sulfide papers prepared by three different procedures, when used in the form of a strip over which a fixed volume of sample is slowly passed. A temperature of 65 C or above was required for maximum reactivity of the mercury vapor with the reactive material on each of the sensitized papers. The length of blackening of selenium paper is directly proportional to the mercury vapor concentration and is insensitive to paper temperatures between 65 and 200 C. Both selenium and selenium sulfide papers retained their original calibration after a year of storage at room temperature in the dark. (Author abstract modified)

15914 APTIC NO. 34292

Stockham, John and Howard Betz

STUDY OF VISIBLE EXHAUST SMOKE FROM AIRCRAFT JET ENGINES. (FINAL REPORT). *IIT Research Inst., Chicago, Ill., Department of Transportation Grant DOT-FA69WA2208. Federal Aviation Administration Rept. FAA-RD-71-22, 75p., June 1971. 15 refs.*

NTIS: AD 726249

A research program was conducted to develop techniques for the objective determination of visibility of jet turbine exhaust smoke and to relate these techniques to the smoke number obtained for engines mounted in test cells. One technique involved a transmissometer to measure the light attenuation of the smoke, while the other technique was photographic photometry. A theoretical model of smoke trail visibility using the physical and optical properties of smoke particles was included. Photographic photometry measurements and Ringelmann observations of in-flight jet aircraft and test engine exhaust were made. Transmissometer measurements, and the filter stain technique were also used to evaluate smoke emissions from tied-down aircraft.

15915 APTIC NO. 33845

Straubel, H.

EVAPORATION MEASUREMENT ON DROPLETS IN THE SUBMICROSCOPIC RANGE. *(Verdampfungsmessung an Tropfen im submikroskopischen Bereich). Text in German. Dechema Monograph., 66(1193-1221):99-107, 1971. 5 refs.*

Electrically charged droplets or solid particles can be freely and stably suspended within a capacitor. The outer plates of the three-plate-capacitor are supplied with direct current voltage. The central plate carries an alternating current of 50 Hz symmetrically toward the other plates. The position and direction of the droplet in the borehole is stabilized by the ac voltage. The dc voltage compensates the weight of the droplet. An ac voltage of determined value immediately gives the charge/mass ratio of the droplet. The mass can be determined either independently by optical means or by the electronic correlation technique. Changes in mass due to moisture absorption or release are conpensated by measurable voltage variations.

15916 APTIC NO. 33503

Tait, G. W. C.

THE ANNULAR IMPACTOR. *12p., 1953 (?). 3 refs.*

An air sampling device based on the impaction principle is described that differs from previous instruments in its capability of sampling at very high rates, of the order of 700 liters/min. This is achieved by using a very simple arrangement of the impactor parts with the jet in the form of an annular region. The impactor is particularly useful for application to the sampling of dusts containing long-lived alpha emitters. Such dusts were previously difficult to assess due to the presence of appreciable concentrations of natural radon decay products. The impaction device differentiates sharply between most relatively coarse industrial dusts and the finer natural dust on the basis of a separation between particles greater than and those less than 0.5 micron in diameter. Good discrimination is achieved since dusts arising from most technical processes have a mass median well over one micron, whereas radon decay products are found elsewhere to be preferentially associated with particles less than 0.04 micron. Minor disadvantages include the possibility of some self absorption of alpha radiation in the compact deposit in the case of heavy dust loadings and a very rapid fall-off of concentration in a sequence of samples taken in a confined space. (Author summary modified)

15917 APTIC NO. 33522

Tammet, Kh. F.

OPTIMUM CHARACTERISTICS OF ASPIRATION COUNTERS OF ATMOSPHERIC IONS. *(Hydrometeorological Service of the USSR, Tr. Vses. Nauch. Meteorol. Soveshuh., 1962, vol. 9. 3 refs. Translated from Russian in: Instruments and Methods for Meteorological Observations, p. 345-351, 1966, by A. Wald, Israel Program for Scientific Translations, Jerusalem.*

NTIS: TT 65-50004

Attempts to find optimum design parameters for integrated counters were described. The sensitivity of a counter is determined by the absolute error if measuring the relative density of charge with the complete absence of ions. Optimum parameters of the counter are determined so as to obtain minimum cost for given sensitivity or maximum sensitivity for given cost. Optimum parameters were calculated (by numerical methods) with given data. With a given range of critical ion mobilities and limited permissible values of voltage and volumetric flow rate, the sensitivity will be optimum with a definite capacitance of the measuring capacitor and deteriorating either with its increase or reduction. In designing the counter for the study of the spectral distribution of small ions, the dependence of the maximum resolving power of the counter on the size of the measuring capacitor must be considered. (Author conclusions modified)

15918 APTIC NO. 33358

Tamori, Ikuo, Nobuyuki Kogure, and Kazunari Imagami

MEASURING OF STACK GAS CONTENTS BY CYLINDRICAL FILTER PAPER METHOD. *(Ento roshigamiho ni yoru juyu boira higasuchu baijin nodo no sokutei). Text in Japanese. Kogai (Hakua Shobo) (Pollution Control), 6(5):12-18, Sept. 1971. 7 refs.*

In sampling dust concentrations in stack gases, a dust tube sampler has usually been utilized. However, the dust tube method has many disadvantages, both in sample preparation and measurement results. A new method is described which uses a glass fiber filter. It has a higher collection efficiency than the dust tube method, as well as lower pressure drop and a shorter and simple preparation. Heavy metals can also be analyzed by the new method. An example is included. (Author abstract modified)

15919 APTIC NO. 33545

Tousset, J.

RADIOACTIVE METHODS APPLIED TO TRACE ANALYSIS. *(Methodes radioactives appliquees a l analyse de traces). Text in French. Preprint, 11p. 1969. 6 refs. (Presented at the Journee sur les methodes modernee de Dosage des Traces, Grenoble, France, Nov. 27, 1969.)*

NTIS: LYCEN-6957

Radioactive trace analysis employs either nuclear reactions or radioactive tracers. Methods based on nuclear reactions include analysis by activation and analysis by detection of emitted particles. The former determines the nature and radioactivity of elements constituting a sample by measuring characteristic radiation emitted by radioactive nuclei resulting from irradiation by a stream of appropriate particles. Analysis by detection of emitted particles is based on exoenergetic reactions involving the element analyzed and on the measurement of the characteristic energy spectrum of the emitted particles. Thus, trace quantities of oxygen, carbon, nitrogen, sulfur, fluorine, boron, and other elements can be measured with great accuracy. Methods utilizing radioactive tracers employ an isotope of the element to be measured, radioactive reagents, or radiometric titration. Isotopic tracer methods are based on the principle of isotopic dilution, the change of specific activity induced by the mixing of the tracer with the sample to be analyzed. Analytical radioactive reagent methods are based on the repartition of the activity of the reagent between the reagent fraction and the surplus fraction. Radiometric titration is based on the determination of an equivalent point obtained by following the radioactivity of the product as fast as it is formed. The radioactivity can be associated with the titrating agent or with the element to be analyzed. The advantages and drawbacks of the various methods are evaluated.

15920 APTIC NO. 33885

Troy, D. J.

MEASUREMENT OF ATMOSPHERIC POLLUTION BY ULTRAVIOLET PHOTOMETRY. *Anal. Chem., 27(8):1217-1221, Aug. 1955. 8 refs. (Presented at the Symposium on Air Pollution, American Chemical Society, 123rd Meeting, Los Angeles, Calif., 1953.)*

A sensitive portable ultraviolet photometric analyzer is an extremely convenient device for determining the concentration of toxic gases and vapors in the atmosphere, but instruments described in the literature have generally been limited to one analytical wave length, 254 millimicrons, and data on the absorptivity of gases and vapors, on which analyzer calibrations could be based, have been scanty. A portable ultraviolet gas and vapor analyzer, based on Hanson's design, has been gradually improved during several years experience with a number of these instruments at several chemical manufacturing plants. The wave-length range of the analyzer has been extended by relatively simple techniques, thereby enhancing sensitivity and minimizing interference. A convenient gas-mixing apparatus for calibrating sensitive gas analyzers under simulated operating conditions at concentrations from 20% to 0.1 ppm is described. The extended wave-length range and the use of the calibrating apparatus have materially increased the utility and precision of the analyzer. (Author abstract modified)

15921 APTIC NO. 33475

Turner, J. M. and R. S. Sholtes

LABORATORY EVALUATION OF THE SULFATION PLATE FOR ESTIMATION OF ATMOSPHERIC SULFUR DIOXIDE. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 16p., 1971. 17 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 64th, Atlantic City, N. J., June 27-July 2, 1971, Paper 71-39.)*

Different aspects of monitoring atmospheric levels of sulfur dioxide pollution with lead dioxide cylinders and sulfation plates were investigated. A series of lead dioxide cylinders and sulfation plates were exposed in parallel to several known concentrations of SO2 for specific times in a stainless steel tank. For each experimental run, most sulfation plates were analyzed photometrically, while several were analyzed gravimetrically. Most lead dioxide cylinders were analyzed gravimetrically, while a few were analyzed photometrically or by both methods. Lead dioxide cylinders are more sensitive to the effects of SO2 than sulfation plates. This may be due to the difference in the geometry of the two instruments, since the cylinder presents a more exposed surface than the plate.

The gravimetric procedure gave more reproducible and consistent results than the photometric method. The sulfation plates were easier to prepare and required only half the time required for preparation and analysis of the cylinders. The shape, or absence, of the shelter appears to affect the sulfation rate of the plates and cylinders. Samples on round shelters gave sulfation results which were closer to open samples than samples in square shelters. Exposure of cylinders and plates to varying concentrations of SO_2 produced curved lines, showing a relationship between sulfation rates and SO_2 condentration. Prediction of atmospheric SO_2 concentrations in ppm from open sulfation plate analyses can be made by multiplying the sulfation value of the plate in mg SO_3/100 sq cm/day by a factor of 0.11.

15922 APTIC NO. 33329

Valori, P. and A. Grella

DEFINITION OF THE ACTIVITY OF ALUMINUM OXIDE USED AS AN ADSORBENT IN CHROMATOGRAPHY: THE ANTHRACENE INDEX. *(Definizione del grado di attivita dell ossido di alluminio usato come adsorbente in cromatografia: indice di antracene). Text in Italian. Nuovi Ann. Igiene Microbiol. (Rome), 17:301-310, July-Aug., 1966. 15 refs.*

Determination of polynuclear aromatic hydrocarbons by column chromatography requires a careful standardization of the activity of the adsorbent material (e.g., aluminum oxide) in the column, since either an excess or a deficiency of this activity destroys the sensitivity of the determinations. The anthracene index is proposed for achieving this standardization. A solution of 0.250 mg/ml of anthracene in cyclohexane containing 10% benzene is used as a standard for determining the amount of water to be used in deactivating the aluminum oxide in the column. The anthracene index is the quotient of the optical density of the eluate, diluted 1:10 with cyclohexane and submitted to spectrophotometry at a wavelength of 376 millimicrons, divided by the extinction coefficient of anthracene (0.050), multiplied by 500. It is recommended that for small-moleculed polynuclear hydrocarbons the anthracene index be fixed at 0.590, which corresponds to using a water content of 4%. For hydrocarbons with five or more benzene rings, a 6% water content is recommended.

15923 APTIC NO. 33646

Vekeny, Henrik

THE WEIGHT DETERMINATION OF THE RESPIRABLE DUST FRACTION BY MEANS OF A DUST SAMPLING UNIT WITH PRELIMINARY AIR SEPARATOR. *(Die gewichtsmaessige Bestimmung der respirablen Staubfraktion mittels Staubprobenahmegeraet mit Windsichter-Vorabscheider). Text in German. Staub, Reinhaltung, Luft, 31(9):367-371, Sept. 1971. 19 refs.*

Respirable dust must be separated from the coarse fraction before its weight can be determined. Two-stage units are available for accomplishing this, the first stage separating the coarse particles and the second stage separating the respirable fraction. For preliminary separation, cyclones and horizontal elutriators are available. An aluminum sampler with vertical elutriation is described in detail. Air enters the sampler at the bottom and rises upward at 15 cm/sec. All dust particles and agglomerations with a falling speed greater than 0.15 cm/sec are separated. Particles with a lower falling speed, i.e., particles with a diameter less than 7.1 micron, rise upward. Sampling speed is 1.5 l/min. The sampler is 35-cm high and 15 cm in diameter. It weighs 2.3 kg. The efficiency of the unit was tested in a dust channel with coal and quartz dust. An efficient separation of respirable from nonrespirable dust was achieved.

15924 APTIC NO. 33524

Walter, E.

A NEW MEASURING AND SEPARATING DEVICE FOR DUST. *(Ein neues Staubmess- und Sichgeraet). Staub (Duesseldorf), 15(46):481-488, 1955. Translated from German by W. H. Everhardy, National Institutes of Health, Bethesda, Md., Translating Unit, 10p., July 30, 1958.*

The dust-sampling and separating device described represents a further development of the cyclone probe. The dust is deposited in a microcyclone whose separating chamber has the diameter of a test tube. The separation of the desired fine particles below five micron from the amount of dust sucked in is obtained by adjustment of the primary cyclone and by introduction of outside air into the separating chamber. The total amount of dust deposited in the test tubes corresponds to the amount of dust in the volume of air sucked in; the very fine portion below five micron in the second stage represents a uniform sample of the amounts sucked in. This portion cannot be evaluated quantitatively but should be used as material for subsequent analyses for industrial hygiene purposes. (Author summary modified)

15925 APTIC NO. 33894

Watts, Spencer R., Francis X. Walsh, and Virginia M. Vought

ANALYTICAL EXPERIENCES WITH BERYLLIUM DETERMINATIONS IN A COMPREHENSIVE AIR POLLUTION STUDY. *Am. Ind. Hyg. Assoc. J., 20(6):500-503, Dec. 1959. 7 refs. (Presented at the American Industrial Hygiene Association, Annual Meeting, 20th, Chicago, Ill., April 30, 1959.)*

A study to determine atmospheric concentrations of beryllium in the area of a beryllium plant located in Pennsylvania was recently undertaken. As a method of determining the concentrations, twenty high-volume type samplers were placed in the area surrounding the plant; as a comparison measure between this and other communities, five background samplers were also placed at various locations in a highly industrial area in another part of the state. Information such as weather conditions, wind direction, weight of particulate collected, and air volumes were recorded for each sample. Samples were collected on an 8 by 10-in. 1106-BH glass fiber filter web and analyzed spectrographically. A number of lung tissue samples and a few soil samples were also analyzed. The analytic procedure, standardization, and quality control of the analytical results are described. Although the working curve possessed a limited range, the actual concentrations encountered were as low as 0.0001 microgram of beryllium per cubic meter in a background area, to as high as 0.300 microgram in a few samples taken near the plant.

15926 APTIC NO. 33878

Welford, George and John Harley

FLUORIMETRIC DETERMINATION OF TRACE AMOUNTS OF BERYLLIUM. *Am. Ind. Hyg. Assoc. Quart., 13(4):232-234, Dec. 1952. 7 refs.*

A procedure for the chemical separation of beryllium and subsequent fluorimetric analysis is described. The filter paper containing the sample to be analyzed is wet ashed, treated with hydrofluoric and sulfuric acids, and dryed. After solution in hydrochloric acid, the iron, aluminum, and other metals are removed by precipitation with oxine in an acetate-buffered solution. The excess oxine is removed with chloroform and the beryllium is precipitated using 2.5 mg of aluminum as a carrier. The precipitate is dissolved and made up to 5 ml with 1N sodium hydroxide. Triplicate 1-ml aliquots are treated with 1 ml of 0.0001% morin, diluted to 5 ml, and the fluorescence measured. The fluorimeter has a sensitivity of 0.005 micrograms and is linear over a range of 100. Known amounts of beryllium were periodically added to filter papers and carried through the regular analysis. The overall recovery of over 200 analyses was about 92%. Each step of the procedure was checked with radioactive beryllium 7 as a tracer with excellent recoveries. The method is recommended for rapid accurate beryllium analysis.

15927 APTIC NO. 33439

Wettig, K.

THE VARIABILITY OF CARCINOGENIC ACTIVITY OF DUST AND SOOT SAMPLES CONTAINING BENZOPYRENE. *(Ueber die unterschiedliche kanzerogene Aktivitaet benzpyrenhaltiger Staub- und Russproben). Text in German. Z. Ges. Hyg Ihre Grenzgebiete (Berlin), 11(6):430-433, June 1963. 9 refs.*

Benzopyrene in dust and in soot must first be separated from the dust to become carcinogenically active. Since the aqueous medium in the human lung cannot accomplish this, blood proteins act as mediators in dissolving benzopyrene. This can occur, however, only if the dust particles are larger than 100 millimicrons; benzopyrene from smaller particles is no longer carcinogenic. Because of this circumstance, the analytical benzopyrene method currently in use may lead to hygienic misinterpretations of the carcinogenic activity of a dust sample. To simulate true conditions, a new benzopyrene determination method is proposed in which the dust sample is just soaked in benzene for five hours at room temperature instead of completely extracting benzopyrene by boiling benzene. Only benzopyrene loosely tied to dust and soot particles is extracted. Depending on the emission source, recovery with this method is about 10-50%.

15928 APTIC NO. 34112

Wiesendanger, Hans U. D.

QUADRUPOLE MASS SPECTROMETRY. *Am. Lab., 1970:35-43, July 1970.*

The quadrupole mass spectrometer has led the trend to less expensive mass spectrometers and has made it possible for the nonspecialist scientific worker to use mass spectrometry as an uncomplicated tool in his own laboratory. It has some limitations; for example, its resolution and mass range do not even approach those of some high-performance double-focusing instruments. It also shows more pronounced decrease of relative sensitivity with increasing mass number compared with magnetic instruments, typically to about one-half at mass 500 atomic mass units. Quadrupole mass spectrometers are commercially available with mass range and resolution to about 1000 amu. The quadrupole mass filter consists of an electrode arrangement of four parallel, precisely aligned metal rods. The electrical quadrupole field is established by applying rf and dc voltages to these rods, with opposite rods connected in pairs and with neighboring rods of different charge sign. An electron beam ion source is located at one end and a detector at the other end of this analyzer structure, often called the head or probe. Ions are accelerated and focused into the quadrupole field between the rods where they undergo oscillations governed by Mathieu's equations. Operation of the quadrupole mass spectrometer is described, as well as its application to gas chromatography, laser analysis of solids, catalysis, kinetics, and reaction mechanisms, thermal analysis, surface research, and ions, beams, and plasmas. (Author conclusions modified)

15929 APTIC NO. 33916

Zaromb, S., J. F. Avellanet, J. Kiwala, B. M. Radimer, W. T. Ingram, and R. M. Schotland

LIDAR SPECTROSCOPY SYSTEM FOR THE REMOTE SENSING OF GASEOUS AIR POLLUTANTS. *Preprint, International Union of Air Pollution Prevention Associations, 24p., 1970. 8 refs. (Presented at the International Clean Air Congress, 2nd, Washington, D. C., Dec. 6-11, 1970, Paper CP-31D.)*

A mobile lidar (laser radar) spectroscopic system currently being evaluated under field conditions, is designed to track invisible air pollutant plumes to their sources, map the distributions of various pollutants in and around industrialized areas, and/or estimate (by remote sensing) the concentrations of specific pollutants from known industrial or natural sources. The system is planned for detection of such common pollutants as sulfur dioxide and ozone in average threshold concentrations of 0.05 ppm and 0.005 ppm, respectively, over a distance range of two to three km, as well as higher concentrations of several other gaseous constituents at shorter distances (100-300 m). The equipment is mounted in a truck designed to follow any observed plumes along the direction of increasing density of a pollutant plume to track the plume to its source. A unique feature is the system's operation at a number of wavelengths starting with a single neodymium-glass laser. The most useful of these wavelengths is the ultraviolet radition output of about 0.1 joule/pulse at 265 manometer, rendering its sensitivity about as good in daytime as at night. The ultraviolet output is especially suitable for detecting several common pollutants by either the absorption or the Raman-spectroscopic technique, and can be transmitted even near airports and in densely populated areas without risking accidental eye injury. Operating details are fully discussed as well as intereferences from Mie scatter and motor vehicle exhausts and comparison with the lidar-Raman technique.

AIR QUALITY MEASUREMENTS

15930 APTIC NO. 33361

Nagano Prefectural Government (Japan), Environmental Sanitation Section

SURVEY REPORT ON PRECIPITATING DUST IN NAGANO PREFECTURE, FISCAL YEAR 1966-1968. *(Nagano-ken no koka baijin chosa hokoku, showa 41 nendo-showa 43 nendo). Text in Japanese. 69p.*

The results of measurements of precipitating dust in Nagano Prefecture recorded in 1966-1968 are presented. Total concentration, soluble components, e.g., ash content, sulfates, chlorides, and calcium compounds, and insoluble content such as tar were measured. The liquid quantity and pH value were also determined. Dust collected by deposit gauges was analyzed on a monthly basis in g/sq m.

15931 APTIC NO. 33363

Air Pollution Monitoring Network Study Group (Japan)

REPORT OF THE STUDIES ON THE DETERMINATION OF CARBON MONOXIDE IN AMBIENT AIR AND ITS TRANSMISSION. *(Kankyo taiki chu ni okeru issankatanso nodo no sokutei oyobi denso ni kansuru kenkyu hokoku sho). Text in Japanese. 199p., March 1971.*

The determination of carbon monoxide in the atmosphere was studied with respect to measurement and analytical methods, selecting measurement stations, and standards for air pollution monitoring stations. Results of air quality measurements in Tokyo and Osaka are presented. Sampling apparatus included manual, continuous, and automatic samplers and a sampling pipe, bag, and pump.

15932 APTIC NO. 33430

SUPPLEMENT TO MONTHLY REPORT. DETAILS OF MEASUREMENT RESULTS. OCTOBER 1970. *(Annexe au rapport mensuel. Detail des resultats de mesure. October 1970. Text in French. Inst. National de la Sante et de la Recherche Medicale, Vesinet (France), Service Central de Protection contre les Rayonnements Ionisants, Rept. SCPRI (RM)-X-1970, 21p. Oct. 1970.*

Some selected radioactivity levels measured during October 1970 on the territory of France are: rain water maximum at nuclear site Fontenay-aux-Roses 84 pCi/l; water from Seine at Vesinet total beta radiation 6.1 pCi/l; irrigation water at Fourques total beta radiation 4.8 pCi/l, at Pichegu 2.4 pCi/l; filtered drinking water from river Rhone mean activity 7.8 pCi/l; milk strontium(90) maximum 24 pCi/l; vegetables Sr-90 mean value 6 pCi/g ashes; bovine thyroid iodine (131) below measurable threshold; salt water fish 11-26 pCi/kg fresh fish; sea water at La Manche Cesium(137) 1.2 pCi/l. Of 21,135 workers in 2947 establishments monitored, 70 exhibited excessive radiation exposure of the third category, two above 25 rems. Radioactivity levels measured at the island of Reunion are listed as are bovine thyroid I-131 levels measured at Madagascar.

15933 APTIC NO. 33560

ACTIVITY REPORT. SEPTEMBER 1970. *(Rapport d activite. Septembre 1970). Text in French. Inst. National de la Sante et de la Recherche Medicale, Vesinet (France), Service Central de Protection contre les Rayonnements Ionisants, Rept. SCPRI (RM)-IX-1970, 12p., Sept. 1970. 20 refs.*

The report published by Service Central de Protection contre les Rayonnements Ionisants summarizes and interprets radiation level data collected by 58 measuring stations all over France and at the island of Reunion. The interpretation involves the classification of the collected data into category I (conforming to norms in force), category II (exceeding norms but representing no danger), and category III (where constant supervision will be provided until return of radioactivity to normal level). Atmospheric radioactivity measured during September 1970 at the reference station at Vesinet was: beryllium(7) 0.044, strontium (90) 0.0023, zirconium (95) and niobium (95) 0.028, ruthenium (103) 0.0019, ruthenium (106) and rhodium (106) 0.018 iodine (131) 0.0010, cesium (137) 0.0038, barium (140) and lanthanium (140) 0.0029 pCi/cu m air. Mean radioactivity in Paris was 0.14 pCi/cu m air. Aircraft contamination at altitude of 12000 m, total surface gamma radiation 0.84 mCi/sq m filter. Rivers, soils, oceans, animals, vegetables, and milk were tested. Occupational health data was also noted.

15934 APTIC NO. 33576

Hyogo Prefecture (Japan), Dept. of Living

PUBLIC NUISANCE IN HYOGO PREFECTURE. *(Hyogo-ken no kogai). Text in Japanese. 197p., Nov. 1970.*

The degree of air pollution in most cities in Hyogo Prefecture has stayed on the same level or increased slightly in recent years, except for Himeji and Akashi cities. Prevalent pollutants in Hyogo cities are carbon monoxide, nitrogen oxides, hydrocarbons, and oxidants created by the photochemical reactions of these material. Standard permissible and actual counts of sulfur oxides, CO, NO, NO2, suspended and settling particulates, lead, and fluoride, compounds are presented in description, tables, and graphs. Average amounts of settling particulates in Hyogo Prefecture run between 5.30 t to 14.52 t/k sq m/month; the highest figure is for Amagasaki city. Kobe city is the next most polluted; measurements at four locations all indicate more than 10 t/month average. The annual average for Kobe in 1967 was 12.78 t; in 1968, 12.54 t and in 1969, 12.87 t. At the highest point in an industrial area of Kobe, settling particulate averaged as high as 17.95 t/month. The annual average of sulfur oxides in Amagasaki in 1968 was 0.083 ppm/hr and in 1969, 0.084 ppm, representing a much higher figure than the maximum permissible amount of 0.05 ppm. Carbon monoxide concentration is 5.0-9.0 ppm/day in Kobe, 2.7-5.8 ppm in Himeji, and 2.3-6.8 ppm in Itami. Monthly averages of NO concentration in Kobe are 80-142 ppb and of NO2, 33-37 ppb. Figures in Himeji, Kakogawa, and Itami are much lower than those of Kobe. Western Hyogo around Akashi, Kakogawa, and Himeji are relatively unpolluted. The Himeji area has especially shown a marked improvement since dust collectors were installed in electric furnaces of iron foundries in 1967. The annual average of settling particulates of 11.12 t/k sq m/month in 1966 decreased to 7.92 in 1967, 6.54 in 1968, and 5.64 in 1969.

15935 APTIC NO. 33776

Nagoya Municipal Office (Japan)

RECENT SITUATION OF AIR POLLUTION AT NAGOYA CITY. *(Nagoya-shi ni okeru taikiosen no genkyo). Text in Japanese. Taiki Osen Nyusu (Air Pollution News), 66:2-6, Sept. 1971.*

Growing industrialization, population growth, unbalanced social investment have created various social problems, including environmental pollution, in Nagoya, Japan. Pollution of Nagoya and its outskirts has become more serious as big industries have come into the reclaimed coastal industrial districts. As a whole, the present situation has improved with decreased concentrations of pollutants. The annual average concentration of sulfur oxides in the southern industrial district has been about 0.055 ppm since 1968, which is in excess of an environmental standard; in the central and northern part of the city it is between 0.04 and 0.045 ppm with a decrease since 1969. The average of particulate fallout for the whole city is less than 10 tons/sq km/month with a little increase since 1969, while the average of dust or ash in the air measures 189 micrograms/cu m with maximum 302 microgram/cu m in Minato-ku area and minimum 130 micrograms/cu m in Moriyama-ku area. Other data of particulates or carbon monoxide are included. A survey on the adverse effect of air pollution to human health was first started in 1970. On July 29, 1971 the first caution against photochemical smog was officially announced with oxidant concentration became over 0.15 ppm.

15936 APTIC NO. 33921

ACTIVITY REPORT. AUGUST 1970. *(Rapport d activite Aout 1970). Text in French. Inst. National de la Sante et de la Recherche Medicale, Vesinet (France) Service Central de Protection contre les Rayonnements Ionisants, Rept. SCPRI (RM)-VIII-1970, 11p., Aug. 1970. 20 refs.*

Service Central de Protection Contre les Rayonnements Ionisants was established in 1956 to conduct research in the area of ionizing radiation to set norms and to devise measurement methods and techniques of prevention that would assure the protection of public health. As a control agency it supervises all pollution caused by radioactive substances including pollution of the atmosphere and of water, pollution caused by nuclear installations, provides for the protection of workers against excessive exposure to radiation, and supervises the use of ionizing radiation in medical and dental practice. Fifty-eight stations covering the whole country measure radioactive fallout at ground level, high altitude measurements are being provided by aircraft from Air France. The SCPRI supplies technical assistance to the Civil Defense Administration and the Ministry of Agriculture in the supervision of the environment, in the certification of installations and of instruments, and in all matters concerning radiological safety. Data is given for air quality measurements. The data is categorized by whether the amount of radiation is less than or above the norms.

15937 APTIC NO. 33942

ACTIVITY REPORT. NOVEMBER 1970. *(Rapport d activite. Novembre 1970). Text in French. Inst. National de la Sante et de la Recherche Medicale, Vesinet (France), Service Central de Protection contre les Tayonnement Ionisants Rept. SCPRI (RM)-XI-1970, 11p. Nov. 1970. 20 refs.*

The report published by Service Central de Protection contre les Tayonnements Ionisants summarizes and interprets radiation level data collected by 58 measuring stations all over France and at the island of Reunion. The interpretation involves the classification of the data collected into category I (conforming to norms in force), into category II (exceeding norms but representing no danger), and into category III (where constant supervision will be provided until return of radioactivity to normal level). Atmospheric radioactivity measured at the reference station at Vesinet in November 1970 was: beryllium(7) 0.052, strontium(90) 0.0015, zirconium(95) and niobium(95) 0.012, ruthenium(103) 0.0026, ruthenium(106) and rhodium(106), 0.024, iodine(131), 0.0021, cesium(137) 0.0018, barium(140) and lanthanum(140) 0.0064 pCi/cu m air. Radioactive contamination of aircraft surface at altitude of 12000 m was 0.23 mCi/sq m filter.

15938 APTIC NO. 34085

SUPPLEMENT TO MONTHLY REPORT. DETAILS OF MEASUREMENT RESULTS. SEPTEMBER 1970. *(Annexe au rapport mensuel. Detail des resultats de mesure. Septembre 1970). Text in French. Inst. National de la Sante et de la Recherche Medicale, Vesinet (France), Service Central de Protection contre les Rayonnements Ionisants, Rept. SCPRI (RM)-IX-1970, 23p., Sept. 1970.*

As a result of the 12th atmospheric nuclear test of October 14, 1970, fallout levels have increased in the far east of French territory. Iodine(131) was detected in bovine thyroid glands from slaughterhouses in Paris, Bordeaux, Orange, and Nancy as of November 3. The maximum level of 4.5 pCi/g fresh organ was reached on November 10 at Nancy. A rise in atmospheric radioactivity at ground level was noted on November 9. The maximum measured was 0.33 pCi/cu m. Some selected radioactivity levels measured during September 1970 were: rain water, maximum at nuclear site at Fontenay-aux-Roses 140 pCi/l; surface water from Seine at Vesinet, total beta radiation 5.4 pCi/l; irrigation water at Fourques, total beta radiation 4.7 pCi/l, at Pichegu 4.6 pCi/l; filtered drinking water from the river Rhone, mean activity 5.5 pCi/l; milk strontium (90) maximum 25 pCi/l; vegetables Sr-90 mean value 5.8 pCi/g ashes; bovine thyroid I-131 level below measurable threshold; salt water fish cesium (137) 17-23 pCi/kg fresh fish; sea water at La Manche Cs-137 0.97 pCi/l; soil analysis of nine samples, maximum Cs-137 level 1300 pCi/kg/sec at Meaudre. Of 20968 workers monitored for radioactivity, 54 exhibited excessive radioactivity of the third category.

15939 APTIC NO. 33539

Bogen, Norma, Steven Fosburg, and Gail Howrigan

ST LOUIS REGION STUDY -- PART I. *In: Computer Mapping as an Aid in Air Pollution Studies. Volume Two: Individual Reports. Harvard Univ., Cambridge, Mass., Lab. for Computer Graphics and Spatial Analysis, National Air Pollution Control Administration Demonstration Grant 68A-2405D, Rept. A, 72p., April 1970. 8 refs.*

The Interstate Air Pollution Study was undertaken as a result of independent requests from official groups in St. Louis, Missouri, and East St. Louis, Illinois, for aid in solving odor problems and in drafting air pollution ordinances. An emission inventory was conducted. Aldehydes, carbon monoxide, hydrocarbons, nitrogen oxides, sulfur oxides, particulates, and benzo(a)pyrene were included in the survey, as well as chemical by-products. Sources of air pollution were divided into the following categories: fuel combustion in stationary plants; combustion of refuse material; fuel combustion in transportation vehicles; industrial process emissions; and solvent evaporation. Since the development of an effective air resource management program begins with identification of the pollutants in the air and determination of the quantity and origin of each type, an air quality measurement program was designed and operated in the metropolitan St. Louis area. Detailed records of air pollution complaints were compiled and summarized from local agency files. Odor surveys were carried out. Topography and meteorological parameters were considered, as well as air pollution climatology. Recommendations were made for an air resource management program. The St. Louis Project of the Air Pollution Demonstration Study focused on levels of pollution, demographic and housing characteristics, and the relationships among these variables. Specific objectives were to map levels of air pollution, to describe the socio-economic structure of the area in spatial terms, and to relate levels of pollution to demographic characteristics. A computer mapping program was employed, with regression analysis to determine the statistical relationships among the variables.

15940 APTIC NO. 34208

Bouquiaux, J and J Grandjean

AIR POLLUTION BY SMOKE AND SO2. *(Pollution atmospherique. Fumee et SO2). Text in French. Bull. Mens. Inst. Royal Meteorol. Belgique, 28p, June 1970.*

The monthly bulletin of atmospheric pollution indexes for June 1970 compiled by the Belgian air pollution recording network contains tables of sulfur dioxide and particulate levels in micrograms/cu m air recorded by 230 measurement stations. One hundred of these stations are located in the five industrial centers of Brussels (25), Antwerp (25), Liege (20), Charleroi (15), and Gand (15), 100 are located in smaller cities in selected regions of Belgium, and 30 are meteorological stations equipped with anemometers. Data are processed by the Computing Center of the Royal Meteorological Institute. The sampling apparatus developed by the Institute of Hygiene and Epidemiology and the Royal Meteorological Institute consists of an electric membrane pump aspirating approximately 2 cu m air per day through a Whatman No. 1 paper filter, a wash bottle containing 50 ml 0.3% H202 solution, and a gas meter. The device contains 8 filter-wash bottle sets, each of which automatically replaces the preceding set at 9:00 each morning. these sets are collected once a week. The filters are analyzed reflectometrically for average daily dust fall levels; the wash bottle contents are titrated acidimetrically for average daily SO2 levels. The city of Brussels in June had a mean daily dust fall of 31 micrograms and a mean daily SO2 level of 107 micrograms (maximum 529, minimum 0).

15941 APTIC NO. 34134

Cavender, James H., William M. Cox, Maurice Georgevich, Norman A. Huey, George A. Jutze, and Charles E. Zimmer

INTERSTATE SURVEILLANCE PROJECT: MEASUREMENT OF AIR POLLUTION USING STATIC MONITORS. *Air Pollution Control Office, Research Triangle Park, N. C., Interstate Surveillance Project and Resources Research, Inc., APCO Pub-APTD-0666, 156p., May 1971. 21 refs.*

NTIS: PB 200519

The Interstate Surveillance Project is reviewed with respect to general description of objectives and monitoring unit, organization and classifications of stations, project data, area evaluation according to pollutant (particulates, sulfur oxides, hydrogen sulfides, acid aerosol, nitrogen oxides, and oxidants), statistical evaluation of data, and general conclusions. A list of project stations throughout the United States, quartile ranking of components, and a data summary are included.

15942 APTIC NO. 33523

Chey, Chan Tzu

HYGIENIC BASIS FOR DETERMINING THE AREA OF THE SANITARY PROTECTION ZONES AROUND GAS-FILLING STATIONS. *(Gigienicheskoe obocnovanie norm sanitarno-zashchitnix zon dla benzozaprabochnix stantzii). Gigiena i Sanit., 24(10):17-21, 1959. 7 refs. Translated from Russian by W. S. Hamilton. Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio, 10p., July 7, 1960*

The air in the vicinity of gas stations was analyzed for the presence of carbon monoxide and benzene vapor. A total of 1038 air samples were obtained by the conduction meter method. The extent of air pollution around gas stations is determined by their size and the intensity of accumulation of autos around them. Carbon monoxide was found 75 m from the station at a concentration of nine mg/cu m. Gasoline vapors were 75 m distant at a concentratioon of five mg/cu m. Noise from automobiles was found 100 m from the station. The distance within the sanitary protection zone should be 100 m for stations selling 300 l/hr, 75 m for those distributing 1500-3000 l/hr, and 50 m for those distributing less than 1500 l/hr.

15943 APTIC NO. 33799

Cukor, P., L. L. Ciaccio, E. Lanning, and R. L. Rubino

CHARACTERIZATION OF THE ORGANIC FRACTION IN AIR PARTICULATE MATTER. *Am. Chem. Soc., Div. Water Air Waste Chem., Gen. Pap., 11(2):205-206, 1971. (Presented at the American Chemical Society, Division of Water, Air and Waste Chemistry, National Meeting, 162nd, Washington, D. C., Sept. 12-17, 1971.)*

The organic fraction of air particulate matter was examined and 4.6% of the constituents were identified. These consist of polyaromatic hydrocarbons and shorter chain hydrocarbons. The organic fraction was presently extracted from the glass fiber filters in a soxhlet extractor using benzene. Three fractions were isolated by chromatography using silica gel and three eluting systems, five percent benzene in hexane, chloroform, and 2-propanol. Molecular weight distribution of the three fractions, determined by gel permeation chromatography, showed a range of 110 to 2300 with an average of 310 to 350. Infrared, thermometric, and elemental analysis of the fractions was carried out. Gas chromatographic analysis resolved C_{20} to C_{32} hydrocarbons in the hexane fraction. The chloroform and 2-propanol fractions contained oxygenated substances with the normalized empirical formula of $C_{32}H_{45}O_4$ and $C_{32}H_{38}O_{10}$, respectively. A combustion engine source was the source for the oxygenated fractions.

15944 APTIC NO. 34008

Dimitriev, M. T.

A STUDY OF ATMOSPHERIC POLLUTIONS AND PHYSICOCHEMICAL PROCESSES PREVAILING IN THE ATMOSPHERE OF THE DDR. *(Ieucheniye atmosfernykh zagryazneniy i fizikokhimicheskikh protsessov, proiskho-dyashchikh v atmosfernom vozdukhe GDR). Text in Russian. Gigiena i Sanit., 36(7):84-87. 1971.*

The main trends in the assessment and control of air quality in the Deutsche Democratische Republic are reviewed. Sulfur dioxide, sulfur trioxide, sulfuric acid, hydrogen sulfide, nitrogen dioxide, ozone, carbon monoxide chlorine, hydrogen fluoride, tetraethyl lead, benzo(3-4)pyrene, dust and soot levels constitute the main pollutants measured during continuous monitoring. The SO_2 concentrations range from 0.03 mg/cu m, in the summer, to 0.32 mg/cu m in winter in the city of Berlin; these fluctuations are due to domestic heating. Automotive exhaust gases constitute the main source for NO_2 pollution which reaches 0.5 mg/cu m during the morning and evening peak traffic hours. There are 16 stations for systematic monitoring of atmospheric ozone, SO_2, dust, and radioactivity. Maximum ozone levels occur during May and June along with other peak photooxidant concentrations related to air pollution. Photochemical generation of ozone, formaldehyde, and other photochemical oxidants in the polluted air constitute an important research area. The popularity of the two-stroke vehicle in the DDR increases the amount of pollutants due to exhaust gas. Thus, benzo(3,4)pyrene and formaldehyde are 30 to 50 and three to five times higher, respectively, than emissions from four stroke vehicles. The exhaust gases from two-stroke vehicles contain 50 mg/cu m lead and the air in the urban areas contains 0.3 to 0.5 microgram/cu m Pb in the DDR. Dust levels vary from 0.1 to 3.0 g/sq m in the cleanest rural areas to between 25 and 120 g/sq m in the industrial areas, with an average of 13 g/sq m in Berlin. Interactions between aerosols and the solubility of these carcinogens in blood serum constitute another area of air pollution research in the DDR. The main research institutes are indicated.

15945 APTIC NO. 33744

Haentzsch, Siegfried, Erdwin Lahmann, and Horst Ruehle

CONTINUOUS MEASUREMENT OF SUSPENDED PARTICULATE MATTER IN AMBIENT AIR. *(Automatische Messungen von Schwebstaub in atmosphaerischer Luft). Text in German. Staedtehygiene (Uelzen/Hamburg), 22(10):231-237, Oct. 1971. 20 refs.*

Continuous measurements of dust concentrations were taken at two sites in Berlin with a dust monitor FH 62. The sampling point was five meters above ground level. An industrial area consisting primarily of the electronics industry was in the vicinity of the station Jungfernheide. About 1 km west of the measuring station was the power plant Ernst Reuter. The residential sections began in about the same distance in an eastern and south-eastern direction. Sampling time was three hours for each measurement. Automatic sulfur dioxide measurements were taken simultaneously. The second measuring station was south of Berlin (in Dahlem) 10 km away from Jungfernheide in a primarily residential area. The maximum value measured at the Berlin-Jungfernheide station was 0.47 mg dust/cu m air. The mean concentration over one year at the same site was 0.10 mg dust/cu m air. Only about 6% of the values exceeded 0.2 mg/cu m. At the measuring station in Dahlem, the concentrations were considerably lower; the maximum measured value was 0.36 mg/cu m. Only 22% of the values were above 0.1 mg dust/cu m, and 1.4% of the values were above 0.2 mg/cu m. The dust concentration of the air first decreased with increasing wind velocity and rose again at a speed of 5 m/sec. Moreover, the dust concentration rose with increasing humidity, with decreasing air temperature, and with decreasing precipitation.

15946 APTIC NO. 33720

Hammje, K. and A. Knauer

THE EMISSION SITUATION IN THE GERMAN DEMOCRATIC REPUBLIC. *(Zur Immissionssituation in der DDR). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 17(9):647-648, Sept. 1971. 35 refs.*

Uniform dust measuring units and methods are used for the determination of emissions throughout the German Democratic Republic. Apart from hourly short-term measurements, twenty-four-hour measurements with aspirators, measurements with mobile units and random samples are taken. The annual averages for the dust sedimentation fluctuate greatly. They are between four and 200 g/sq m/30 days. Maximum values of 1000 g/sq m/30 days were measured in the industrial areas. In the city area of Halle, long-term emission concentrations for sulfur dioxide were between 0.35 and 0.61 mg/cu m and short-term concentrations of 1.10 and 1.68 mg/cu m were found in the period from 1964 to 1967. In the industrial area of Bitterfeld short-term SO_2 concentrations between 0.6 and 1.0 mg/cu m, and in Merseburg between 0.4 and 0.9 mg/m, were measured. The maximum allowable concentration of 0.5 mg/cu m has thus been exceeded in most cases. Moreover, in the area of Bitterfeld, the maximum allowable concentration for hydrogen sulfide was exceeded, in Merseburg that for phenol and H_2S was exceeded.

15947 APTIC NO. 34094

Hanan, Joe J.

PRELIMINARY AIR ANALYSES IN THE DENVER AREA. *Colo. Flower Grow. Assoc. Bull., no. 225:1-4, Feb. 1969. 2 refs.*

On November 19, 1968, a series of air samples were taken in the Denver metropolitan area, primarily to determine the presence or absence of ethylene in significant quantities. Several highly reactive materials were found in the air samples by gas chromatography, showing typical patterns for automobile exhaust. At least two Denver locations had ethylene concentration in excess of 100 ppb. The most sensitive plants show damage from ethylene at 10 ppb. Meteorological conditions methane, ethane, acetylene, propane, propylene, and isobutane were also measured.

15948 APTIC NO. 34189

Hazama, Kazuo and Tsuyoshi Murakami

CARBON DIOXIDE CONTENT OF AIR IN THE SERICULTURAL EXPERIMENT STATION. *(Sanshi shikenjo ni okeru kuku-chu no tansan gasu nodo ni tsuite). Text in Japanese. Sanshi Kenkyu (Acta Sericologica), no. 64:18-25, July 1967. 8 refs.*

The concentration of carbon dioxide in the air of a sericultural experiment station was determined to ensure the accuracy of measurements of photosynthesis or respiration of mulberry trees. An infrared ray gas analyzer was used to gather samples at heights of 4, 6, and 15 m. Fluctuations due to climate and the active photosynthesis and respiration of plants were extreme. The highest concentrations (440 ppm) were determined at 15 m between 5 and 6 pm, but decreased to 250 ppm during the day. The maximum concentration at 6 m was 350 ppm; at 4 m, CO2 concentration never exceeded 300 ppm, with characteristic minimal diurnal fluctuations except in periods of heavy rain. Air samplings for measurements of photosynthesis were most effective at approximately 4 m, where diurnal fluctuations due to climatic or environmental factors were relatively small.

15949 APTIC NO. 33858

Heaney, Robert J.

DISTRIBUTION OF TRACE ELEMENTS IN THE VICINITY OF AN INTEGRATED PRIMARY COPPER PRODUCTION FACILITY. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 31p., 1971. 4 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 64th, Atlantic City, N. J., June 27-July 2, 1971.)*

A comprehensive air surveillance network has been established near an integrated primary copper production facility to gather air quality data related to its emissions and those of other potential sources. The results form this sampling network are analyzed. Several types of air samplers were used in the study. Fluoride concentrations were monitored using calcium oxide or calcium formate-impregnated filter papers. Sulfur oxides were sampled with the lead peroxide-coated cylinder method. Dust was monitored using high volume and low volume filter samplers for suspended dust, and dust fall jars or adhesive papers for settling dust. Data from these samplers were analyzed in several ways: on a 10-year statistical basis to establish averages, ranges, and long-term trends and annual variations; on an average monthly basis to determine seasonal variations; and on a statistical basis to determine the approximate lognormality of the data. The data analysis indicates slight decreasing trends for copper and sulfur oxides and significant decreases for fluorides. Review of the monthly data shows the gaseous constituents, sulfur oxides and fluorides, are more subject to seasonal meteorological variations than the particulate constituents. There was an inverse relationship between suspended and settling dust, with the former being higher during the windier months and the latter during the more stable inversion months. Clear relationships were shown for concentrations of various constituents with distance from known sources. The analysis of statistical distributions showed that both gaseous and particulate matter-related constituents are approximately log-normally distributed. (Author abstract modified)

15950 APTIC NO. 34136

Huey, Norman A. and George A. Jutze

AREA EVALUATION. *In: Interstate Surveillance Project: Measurement of Air Pollution Using Static Monitors. Air Pollution Control Office, Research Triangle Park, N. C., Interstate Surveillance Project and Resources Research, Inc., APCO Pub-APTD-0666, p. 33-45, May 1971.*

NTIS: PB 200519

Area measurements correlated with pollutants as part of the Interstate Surveillance Project are reviewed. A relative severity index for particulates, sulfur dioxide, hydrogen sulfide, acid aerosols, nitrogen oxides, and oxidants was determined for each of the areas. Areas with a severity index of S (severe) or X (moderately severe) were further analyzed by category of estimated emission densities. Areas with minimum annual particulate emission densities of 15 tons/sq m had a severity index of S or X, as was true for most areas with annual sulfur oxide emission densities of 50 tons/sq m. Most areas with an index of S or X had sources of high particulate emissions, major point sources of SOx emissions, sources of hydrogen sulfide, and potential emission sources of NOx and acid aerosols. Areas that were relatively unpolluted by these showed a high oxidation potential. (Author summary modified)

15951 APTIC NO. 33708

Koike, Kazumi, Norikatsu Hanamura, Kazuma Ishida, Banichi Tomida, Jun-ichi Hayashi, and Kazuo Toyoshima

DUST FALL IN THE NEGHBORHOOD OF A PAPER MANUFACTURING FACTORY (V). *(Seishi kojo shuhen no kokajin chosa ni tsuite. (Dai 5 ho)). Text in Japanese Aichi-ken Eisei Kenkyushoho (Rept. Aichi Inst. Public Health), no. 21:145-150, March 1971. 6 refs.*

Dust fall measurements in the vicinity of a pulp paper factory were correlated with effects of wind direction and velocity, rainfall, and output of pulp. Samples were collected by deposit gauge on a monthly basis. The increase in dust fall value at two measuring stations determined the influence of wind direction in the summer. Later measurements showed no increase in dust fall concentration, determining that the absolute quantity of particulate matter discharged from the factory was decreased, and the deposit gauge was effective.

15952 APTIC NO. 34200

Lahmann, Erdwin

SCIENTIFIC CONFERENCE ON AIR MONITORING AND DETERMINATION OF AIR POLLUTANTS. *(Wissenschaftliches Kolloquium ueber Methoden der Luftueberwachung und der Wirkungsbestimmung von atmosphaerischen Schadstoffen). Text in German. Bundesgesundheitsblatt (Berlin), 13(14):189-92, July 3, 1970.*

A conference held in the Federal Health Institute in Berlin-Dahlem in January 1970 is reported. The continuous measurement of atmospheric carbon dioxide over the Atlantic Ocean during an expedition of the German exploration ship Meteor in 1969, between the latitudes of 10 degrees south and 60 degrees north, was described. A representative of the Bayer Chemical Works, Leverkusen, reported on systematic measurements of emissions and weather conditions in the general factory area. Sulfur dioxide, carbon dioxide, carbon monoxide, hydrocarbons, nitric oxides, sulfide of hydrogen, and chlorine are being measured with special automatic apparatus developed by the firm. Half-hour values are recorded on punch cards and evaluated monthly, quarterly, or yearly by computer. Of special interest are evaluations indicating relationships between immissions and emissions. A report from a measurement station at the Munich-Riem airport shows maximum average SO2 concentrations occurring at a 50-m altitude height compared with those at higher elevations and at ground level. Installations in the Berlin area feature monitoring networks with fully automatic telemetric transmission of results to data processing centers. Such automation can be further developed to the point of relating warnings from the processing center to industrial emission sources when excessive concentrations of specific pollutants occur.

15953 APTIC NO. 33996

Matsumoto,Koku and Yuzuru Kitamura

ENVIRONMENTAL HYGIENIC INVESTIGATION OF AIR IN OSAKA PREFECTURE. II DETERMINATION OF CONCENTRATIONS OF CARBON DIOXIDE AND DUST IN THE UNDERGROUND MARKET-STREETS OF OSAKA CITY. *(Osakafuka kakuchiku no kankyo* *chosa ni tsuite (dainiho)--shutoshite chikagai ni okeru nisanka tanso to jin ai nodo no sokutei). Text in Japanese. Eisei Kagaku (J. Hyg. Chem.), 17(5):357-361. 3 refs.*

Concentrations of carbon dioxide and dust were measured in underground shopping centers, subway stations and trains, tearooms, movies theaters, bowling alleys, and various department stores in Osaka city. Test periods were October 1969 to January 1970; December 1970 to January 1971. Underground shopping centers were relatively well ventilated and little pollution was found in comparison with other facilities. Dust concentrations averaged from 0.53 to 1.50 mg/cu m and carbon dioxide concentrations ran from 0.04 to 0.08%. Mean dust concentrations ranged from 0.99 to 1.47 mg/cu m at a railroad station and 0.97 to 2.04 at one busy department store. The CO_2 concentration in a bowling alley was 0.06 to 0.13%, a movie theater 0.06 to 0.09%, a tearoom 0.15 to 0.20%, and a department store basement 0.10 0.19%.

15954 APTIC NO. 33733

Mayaudon, Enrique Marquez

ENVIRONMENTAL POLLUTION. *(Contaminacion ambiental). Text in Spanish. Salud Publica Mexico, 13(2):133-140, March-April 1971. 5 refs.*

Environmental pollution in Mexico is reviewed. According to statistical estimates, the daily consumption of 7672/cu m of gasoline and 944/cu m of diesel fuel in 1970 was responsible for daily emissions of 3745 CO20 kg of pollutants. Data on individual pollutants determined that 3,388,360 kg of carbon monoxide, 4844 kg of aldehydes, 225,000 kg hydrocarbons, 65,000 kg nitrogen dioxide, 7369 kg organic acids, and 24,000 kg of particulate matter. Industrial exhausts, trains, and airplanes also contributed to the increase of air pollution. Air pollution measurements at 10 stations determined the yearly, monthly maximum, and daily maximum average concentrations for sulfur dioxide, particulate matter, sedimented dust, and sulfur trioxide. The values revealed a definite general increase in pollution levels, especially for SO_2.

15955 APTIC NO. 33973

Ose, Youki, Taira Ikeda, Youko Tanak, Hayaki Niwa

STUDIES ON PUBLIC NUISANCE CAUSED BY AIR POLLUTION (III). AIR POLLUTION IN GIFU CITY. *(Taikiosen ni motozuku kogai ni kansuru kenkyu (3) Gifu-shi no taikiosen). Text in Japanese. Gifu Yakka Daigaku Kiyo (Ann. Proc. Gifu Coll. Pharm.), (20):9-16, June 1971. 5 refs.*

From 1963 to 1965, the measurement of sulfur oxides and nitrogen oxides was performed at eight places in Gifu City. The mean value of sulfur oxides in the city was 0.31 mg SO_3/day/100 cu cm in the city, the highest value was 0.71, and the lowest was 0.01. This air pollution seems to have been produced by fuel from bathhouses, restaurants, and homes. The mean value of nitrogen oxides in the city was 0.063 mg NO_2/day/100 cu cm, the highest value was 0.192, and the lowest was 0.07. The value of nitrogen oxides had a tendency to increase in winter seasons. On the 10th and the 15th of June, 1963, smog was noticed. On the 10th, sulfur dioxide was more than 0.2 ppm, and on the 15th, SO_2 concentration was very low, but carbon dioxide concentration was more than 0.1% (it is usually 0.035%), even though only temporarily. It was caused by burning wheat straw in the area.

15956 APTIC NO. 33488

Oyanguren, Hernan, Luis Prieto, and Luis Ferrada

AIR POLLUTION. *(Contaminacion atmosferica). Text in Spanish. Rev. Med. Chile (Santiago), 98:34-41, Jan. 1970. 4 refs.*

The medical aspects of air pollution are reviewed, with special attention to local problems. The sources of pollution in Santiago, Chile, consist of about 10,000 industries, 130,000 automotive vehicles, 800 central heating plants, 1300 home incinerators, and a large coal-burning thermoelectric plant. A study of settling dust was conducted in 1964 by the Institute of Occupational Health and Air Pollution. In 1965, with the influx of additional funds, the program was expanded to include measurements of sulfur dioxide concentrations and suspended dust. In 1968-1969, pollution from automotive sources was measured, including total oxidants, nitrogen oxides, and aldehydes. The yearly average dust fall is below the critical level of 0.70 mg/sq cm for a 30-day period, although this level is exceeded during the winter months. On the other hand, the yearly average is continually above the permissible level of 0.2 mg/cu m, with particularly high values in autumn and winter. In 1969 urban and rural readings were compared for suspended dust and sulfur dioxide. Urban readings of SO_2 were 10 times as high as the rural, the rural maximum was 8 mcg/cu m, or 0.003 ppm, in April, and readings were less than 0.002 ppm for most of the samples taken. Procedures for investigating the medical effects of pollution, with special emphasis on chronic respiratory diseases, are outlined.

15957 APTIC NO. 33319

Senkevich, P. I.

EVALUATION OF ATMOSPHERIC POLLUTION IN NAVAL PREMISES BY DETERMINATION OF OXIDIZABILITY OF AIR. *(Otsenka zagryaznennosti vozoluchnoy sredy sudovykh pomeshcheniy meodom opredeleniya okislyaemosti vozdukha). Text in Russian. Voenno-Med. Zh., no. 3:51-52, March 1967.*

The properties of the atmosphere inside inhabited ships were studied under varying ventilation conditions. The temperature of the atmosphere, relative humidity, carbon dioxide content, and oxygen content of the air were measured. The determination oxygen better characterizes the atmosphere than the CO_2 determination, since the latter does not take into account products of the life activity of people and products separated into the atmosphere by technological processes and materials.

15958 APTIC NO. 33902

Shoji, Hikaru, Takeo Yamamoto, and Konosuke Nishida

STUDIES ON THE AIR POLLUTION DUE TO AUTOMOBILE EXHAUST - THE GAS CHROMATOGRAPHIC ANALYSIS OF THE HYDROCARBONS IN THE AIR IN THE HIGHWAY TUNNEL AND ITS VICINITIES. *Trans. Japan Soc. Civil Eng., no. 132:34-41, Aug. 1966.*

Between January 20, 1964 and May 9, 1965, air inside the Tennozan Highway Tunnel (in Yamazaki, Kyoto Prefecture) was sampled with cold traps and analyzed with a gas chromatograph with a flame ionization detector. Traffic volume at the time of the investigation was about one-quarter of the contemplated maximum traffic volume of the highway (20,000 cars/day). Thirty different kinds of hydrocarbons were identified in the tunnel air. The concentration of total carbons was about 900-1200 ppm. Of the total hydrocarbons, 23% were saturated hydrocarbons, 75% unsaturated hydrocarbons, and 2% aromatic hydrocarbons. Carbon dioxide and carbon monoxide concentrations were 0.5-1.5% and 20-80 ppm, respectively. Values of all pollutants increased linearly with increase of traffic volume. At maximum traffic volume and in the absence of a ventilation system, the tunnel air would contain about 2100 ppm of total hydrocarbons, 2.5% of carbon dioxide, and 200 ppm carbon monoxide.

15959 APTIC NO. 33924

Skramovsky, Vaclav

ESTIMATION OF 3,4-BENZPYRENE IN THE ATMOSPHERE OF PRAGUE. *(Stanoveni 3,4-benzpyrenu v prazskem ovzdusi). Text in Czech. Acta Univ. Carolinae, Medica, no. 5:415-452, 1963. 79 refs.*

Because lung cancer mortality is increasing, a study was conducted to determine the presence of 3,4-benzpyrene in atmosphere of Prague and to determine its sources. Samples were taken by the sedimentation and aspiration methods and extracted by a mixture of benzene-petrolether. Column and paper chromatography were used to analyze the extracts. For quantitative estimation, the zones corresponding to 3,4-benzpyrene were marked in ultraviolet light, cut out, and eluted by benzene. This was measured by spectrophotometry. The results show that the concentrations of 3,4-benzpyrene in the atmosphere of housing quarters rises in the winter and is low in the summer. Low concentrations occurred in industrial areas in summer and winter. However, increased 3,4-benspyrene values were found in settling particulates near industrial areas. In a mixed area, the values were characteristic of a residential area. The high values found near a railway station are attributed to imperfect steam engine combustion. Imperfect domestic stoves are the principal source of atmospheric 3,4-benzpyrene.

15960 APTIC NO. 33472

Solomon, Allen Morris

EFFECTS OF SUBURBANIZATION UPON AIRBORNE POLLEN IN NORTHEAST NEW JERSEY. *Rutgers -- The State University, New Brunswick, N. J., Dept. of Botany, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms Inc., 1970, 142p. 84 refs.*

A study to ascertain the effects of changing land use upon airborne pollen composition and quantities was completed in 1969 in northeastern New Jersey (Bergen County). Evidence of changes in airborne pollen was provided by: four daily airborne pollen surveys completed in 1932, 1953, 1954, and 1967; pollen extracted from sediment cores which were taken from man-made lakes; and a contemporary pollen rain transect which utilized simple pollen traps in an attempt to duplicate in space the sequence of land-use changes that had occurred through time. Evidence for changes in land use was provided by statistics from the U. S. Census Bureau and the Bergen County Planning Board, and land-use analyses conducted at each transect pollen-collecting site. The evidence indicates that agricultural land use reached its peak in northeast New Jersey about 1860, when more than 80% of Bergen County s land was in farms. By 1930, only about 12% of the county was being farmed while more than 70% was in various stages of secondary plant succession. The effects of this massive and rapid shift from a general land use dominated by declining agriculture to one dominated by steadily increasing suburbanization are found in the pollen rain. The decline of herb pollen with restriction of sites for weed growth is notable, particularly in the grasses. Ragwood, on the other hand, has maintained its relative proportion of the total pollen rain and actually increased in absolute frequency as newly disturbed construction sites have become available. Other changes include a shift in tree pollen composition with initial maxima in ash and birch preceding dominance by oak pollen. Clearly these changes resulted from growth and maturity of forest vegetation on the older abandoned lands. With increased density of suburban land use, the absolute frequency of tree and herb pollen of almost all species declined. (Author abstract modified)

15961 APTIC NO. 33351

Spirtas, Robert and Howard J. Levin

PATTERNS AND TRENDS IN LEVELS OF SUSPENDED PARTICULATE MATTER. *J. Air Pollution Control Assoc., 21(6):329-333, June 1971. 7 refs.*

The National Air Surveillance Network has collected samples of suspended particulate matter since 1957. These data values are graphically summarized by the application of Whittaker-Henderson Type A curvesmoothing formulas to 10 years of data. Fifty-eight urban sites and 20 nonurban sites are studied by this technique, which permits an intuitive grasp of the underlying cyclical patterns as well as long-term trends in nationwide levels of suspended particulate matter. Seasonal patterns are evident for many urban and nonurban sites, although sharp contrasts in seasonal characteristics exist between the two types of sites. Long-term levels tend slightly downward at many urban locations, but the opposite effect is observed at many nonurban sites. (Author abstract)

15962 APTIC NO. 33877

Stefanescu A. and L. Stanescu

DETERMINATION OF ANTHRACENE IN THE AIR DURING THE MANUFACTURING OF CARBON BLACK, BY MEANS OF GAS CHROMATOGRAPHY. *(Determinarea gaz-cromatografica a antracenului in aer la fabricarea negrului de fum). Text in Rumanian. Rev. Chim. (Bucharest), 6(4):226-229, 1965. 5 refs.*

The concentration of anthracene in the air of a carbon black manufacturing plant varied from 1.25 mg/cu m in the loading area to 2.11 mg/cu m in the combustion area. Considering the fact that an adult inhales about 17 cu m of air in 24 hours and that a fraction of the anthracene inhaled is eliminated through the act of expiration, the amount of anthracene inhaled by the workers in the areas mentioned varied from 5.31 to 8.97 mg over a six hour shift. According to the standards set by the American Conference of Governmental Industrial Hygienists, the maximum permissible level of anthracene in the air of 0.1 mg/cu m. In the present study, the anthracene was collected over activated charcoal; following desorption, the anthracene was determined quantitatively by chromatography in a column of ethylene glycol succinate and infusorial earth, at a temperature of 180 C. In addition to anthracene, nonidentified heavier and lighter compounds (probably polynuclear hydrocarbons) were also detected.

15963 APTIC NO. 34212

Susuki, Takeo, Toshikazu Okita, and Ikuo Watanabe

MEASUREMENT OF HYDROCARBON IN THE AIR BY GAS CHROMATOGRAPHY. *(Taikichu tanka suiso no gasu kuromatogurafu ni yoru sokutei). Text in Japanese. In: Studies on Formation of Hydrocarbon and Photochemical Reactive Material and Their Influences. Joint Team for the Study of Photochemical Reactions, Tokyo (Japan), p. 17-36, April 1970.*

Comparative analyses of hydrocarbon concentrations in air samples from Tokyo and Riverside, California are examined. Entire hydrocarbon content and individual concentrations of methane, ethane, ethylene, and acetylene were determined by gas chromatography. Special care was exercised in determining the standard gas. The air samples from Riverside were exposed to ultraviolet irradiation and then analyzed. Acetylene, ethane, propane, and butane showed almost no change in concentrations; ethylene, propylene, and butene decreased in concentration or disappeared completely. The values of methane, ethane, and propane were not geographically concentrated for Tokyo; acetylene, ethylene, and propylene concentrations determined large geographic variations.

15964 APTIC NO. 33425

Tebbens, Bernard D.

GASEOUS POLLUTANTS IN THE AIR. *In: Air Pollution. Arthur C. Stern (ed.), Vol. 1, 2nd ed., New York, Academic Press, 1968, Chapt. 2, p. 23-46. 45 refs.*

Gaseous pollutants that may be present in the air are described, and the expression of gas concentration, the importance of averaging the time on air quality data, the components of normal air, and the effect of water vapor from air pollution standpoint are discussed. Carbon dioxide concentration has been suggested as an index of the total amount of combustion and natural ventilation in an urban environment, but the CO2 level in any area where vegetation is plentiful has typical diurnal and seasonal variations. Carbon monoxide, emitted by internal combustion engines, is found in the greatest concentrations where traffic is heaviest. The lack of information of CO concentrations stems from its lack of effect on any of the human senses. Hydrocarbons are also present in the atmosphere, including oxygenated hydrocarbons such as the aldehydes. Sulfur dioxide is more prevalent in the air than sulfur trioxide, while hydrogen sulfide is an occasional air pollutant, known for its unpleasant odor. Mercaptans are among the odorous gaseous by-products of the kraft pulping industry. Continuous monitoring has shown that nitrogen dioxide predominates during nighttime, while during the day NO and nitrogen dioxide may be equally abundant. The recognition of peroxyacetyl nitrate as a serious phytotoxicant has stimulated intensive study, employing very sensitive chromatographic procedures for identification and quantitation of PAN. The presence of ozone, oxidants, and fluorides in the atmosphere is briefly discussed.

15965 APTIC NO. 33595

Wettig, K., A. Ja. Chesina, W. H. Doerre, and N. Gussjewa

EXTRACTION OF BENZO(3-4)PYRENE FROM AIRBORNE DUST. *(Versuche zur Extraktion von 3,4-Benzpyren aus atmosphaerischem Staub). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 17(9):649-651, Sept. 1971. 27 refs.*

The benzo (3,4)pyrene pollution of the Berlin atmosphere was determined and compared with that of other cities. High volume Air Sampler with paper, synthetic, and glass fiber filters was used for sampling. A two-stage dust collector was used for the determination of the benzo(3,4)pyrene content in two different grain size fractions. It consisted of a cyclone for preliminary separation of coarse dust (around 1.5 micron) and a filter for the fine dust collection. Two methods were used for the extraction of benzo(3,4)pyrene: cold extraction with benzene (300 ml/filter) for four hours at room temperature, and hot extraction of the residual matter separated by filtration of the cold extract with a Buechner Funnel. The benzo(3,4)pyrene content in the atmosphere above East Berlin was comparable to that in other large cities. Naturally it was higher in the vicinity of the gas work that in the city center. The benzo(3,4)pyrene content was found in the respirable dust fraction. The hot extraction of the filters which were first subjected to cold extraction with benzene yielded an additional extraction of 2 to 10% benzo(3,4)pyrene. An extension of the hot extraction period beyond six hours brought no detectable increase of the benzo(3,4)pyrene content. A comparison of the results of cold and subsequent hot extraction showed that cold extraction alone removes almost the entire benzo(3,4)pyrene from atmospheric dust.

15966 APTIC NO. 33638

Wiffen, R. D. and M. J. Heard

UNIDENTIFIED AIRBORNE ORGANISM. *Nature, vol. 224:715-716, Nov. 15, 1969.*

Between June and October 1968, a daily sample of atmospheric aerosol was collected at Harwell for examination by electron microscopy. Single or grouped organisms with a structure suggesting a biological origin were found in six samples collected under various meteorological conditions. The mean number of groups of specimens was 1.5 per grid, corresponding to approximately 1/5 l of air sampled. The particles appeared to be hollow, probably spherical skeletons with a hexagonal structure and possibly some internal structures. They were of remarkably constant size (0.4-0.5 micron in diameter), and the material of which they are composed does not diffract electrons and is unaffected by prolonged heating in the electron beam. The organisms resemble cultures of Thermactinomyctes vulgaris but there is no close parallel.

15967 APTIC NO. 33400

Yasuda, Hiroyuki and Yoko Okamoto

MEASUREMENT OF SULFUR OXIDES, NITROGEN DIOXIDE AND CHLORIDE IN ATMOSPHERE IN KINKI REGION BY THE ALKALINE FILTER PAPER METHOD. *(Arukari roshiho ni yoru keihanshin chiku o shu to suru Kinki chiho taiki osen jokyo no chosa). Text in Japanese. Mukogawa Joshi Daigaku Kiyo (Bull. Mukogawa Womens Univ.), no. 18:329-341, Sept. 1971. 1 ref.*

A long-term investigation of sulfur oxides, nitrogen oxides, and chloride ions in the air of the greater Kobe-Osaka-Kyoto area was initiated in November 1969. The results of 12 months thereafter are reported. Thick 5 by 13 cm pieces of rice filter paper containing potassium carbonate were hung under eaves of buildings or left in screen boxes for a month. When they were retrieved, oxide gases on both sides of the paper were dissolved in water. Sulfur oxides were colored by chloranil acid barium; nitrogen oxides were colored by sulfamine and naphthylethylenediamine, and chloride ion was colored by chloranil acid secondary mercury; all were tested by the ray of wave length 530 millimicron, and absorption coefficiencies were measured. The results were presented in 19 graphs covering 35 test locations from Osaka, Kobe, Akashi, Himeji, Kyoto, Toyonaka, Suita, Nara, Yoshino, Amagasaki, and Awaji Island. The results from the Osaka and east Amagasaki showed an alarming situation of air pollution of all three elements. By contrast, the Nara area, which is still free of industries, showed conspicuous cleanliness of the air. Increases in both SO3 and NO2 values were noted in winter in all areas. Fluctuations of Cl(-) counts in Osaka and Amagasaki were rather prominent, but they seemed to have no relationship with seasons. It was confirmed that pollutants were diluted in proportion to the distance within a certain distance from the emission sources.

15968 APTIC NO. 33861

Yocom, John, William L. Clink, and William A. Cote

A STUDY OF INDOOR-OUTDOOR AIR POLLUTANT RELATIONSHIPS. (VOLUME II. FINAL REPORT). *Research Corp. of New England, Hartford, Conn., NAPCA Contract CPA 22-69-14, Rept. APTD-0592, p. 123-151, May 1970.*

NTIS: PB 195338

To study the effect of home heating and cooking systems on indoor/outdoor pollutant relationships, carbon monoxide was measured at two gas-heated homes and CO, sulfur dioxide, and soiling particulate matter were measured at two coal-heated homes over 48-hr periods during late winter, 1969. The use of single instruments to sample a number of locations by means of solenoid valves and an appropriately designed sampling manifold was an excellent method for obtaining comparative indoor-outdoor air pollutant concentrations. In the two gas-fired homes, the heating system had no measureable effect on the indoor or outdoor CO levels; however, the gas-fired stoves in each house had a significant influence on indoor CO levels. Kitchen-generated contaminants diffused readily through those parts of the house at the same elevation as the kitchen, but rooms at a lower level than the kitchen did not respond to the same extent as rooms on the same elevation. Attached garages having a door opening from the garage directly to the house proper were a significant source of CO inside such houses. Carbon monoxide and soiling particulate matter from external sources readily penetrated all homes. After some time lag, indoor concentrations assumed levels approximating those outdoors. Sulfur dioxide from external sources penetrated homes but was lost to a variable extent depending upon what appear to be meteorological factors and levels of indoor activity. In coal-fired hot air heating systems with apparent leaks, indoor concentrations of CO and SO2 approached levels capable of producing adverse health effects. Hot air heating systems caused rapid dispersal throughout the house of internally generated pollutants. (Author summary modified)

ATMOSPHERIC INTERACTION

15969 APTIC NO. 33381

Japan Meteorological Assoc. (Japan)

STUDY ON THE INFLUENCE OF CITY STRUCTURE ON AIR POLLUTION. FISCAL YEAR 1969. *(Toshikenchiku kozo no taikiosen eno eikyo ni kansuru kenkyu. Showa 44 nendo). Text in Japanese. 226p., 1970 (?).*

Urban air pollution was studied with respect to the following: The present state of pollution by carbon monoxide and sulfur dioxide and future pollution by fuels, dust, and automobile exhaust gases; the influence of heat islands, wind, humidity, and rainfall plus the relation of buildings and space (based on research in Tokyo); and the influence of the city structure on atmospheric diffusion in cities (based on experiments performed in St. Louis). Since a quantitative grasp of the relationship between city structure and sea winds is necessary, several experiments are being conducted at seaside cities in Japan. The air layer and air current around two buildings in Tokyo was studied. Reports on two wind-tunnel experiments using a building model are given. An air-pollution prevention policy based on observations of city structure is suggested.

15970 APTIC NO. 33574

Study Group of Air Pollution Phenomenon in Urban Area (Japan)

STUDY ON COMPUTER UTILIZATION FOR PREVENTION OF AIR POLLUTION. *(Taikiosn boshi no keisanki riyo ni kansuru kenkyu). Text in Japanese. 150p., March 1968. 89 refs.*

Air pollution data measured in Tokyo in August and December 1967 was statistically manipulated with a computer to obtain information on (1): the mutual relationship among density of air pollutants; (2) the characteristic pattern of air pollution by sulfur dioxide in each district in Tokyo; and (3) the relationship between high and low air pollution levels in each district and meteorological factors. The component analysis method was used for preparatory analysis of complex air pollution phenomena. In analyzing (1), a resemblance in change of density of all air polluting substances was noticed, and factor analysis of pollution was practiced. For (2), Tokyo districts were grouped according to sectional characteristics of SO2 pollution in winter and summer. The degree to which measured values at two points represented sectional SO2 density was studied. For (3), the discriminant analysis method was used to examine the relationship between winter and summer SO2 concentrations, high and low contamination by suspended dust, and wind direction and velocity.

15971 APTIC NO. 33712

Miyagi Prefecture (Japan)

INVESTIGATION ON METEOROLOGICAL CONDITIONS IN SENDAI-SHIOGAMA DISTRICT. *(Sen-en chiku ni okeru kisho chosa). Text in Japanese. 117p., March 1971.*

Meteorological data for the Sendai-Shiogama district are examined. Frequency of wind directions for individual months, tables of average wind velocity, monthly wind directions and daily fluctuation of mean wind velocity are investigated. The results of an investigation on air-temperature inversion are reviewed. Inversions at ground level frequently occurred during autumn and spring; the rate of occurrence was 6.8% at 9:00 am and 16.4% at 9:00 pm. The average height of the upper limit of the layer at 9:00 in the morning and the evening was 200 400 m and 100 - 400 m. Air temperature lapse rate was approximately -1 C/100 m in the layer. Air inversion at the upper layer occurred in temperate season at rates of 17.8 and 16.2% at 9:00 the morning and evening, respectively. Height of the base layer was 200 500 m; air temperature lapse rate was 0.8 and 0.6 C/100 m for 9:00 in the morning and evening. The height of the base layer was closely related to pollutants emitted from high stacks and chimneys during inversions. Air instability of air temperature lapse rate at 0.9 C/100 m) was more frequent in the morning than at night and occurred at higher rates in the lower layer.

15972 APTIC NO. 33944

Environmental Science Services Administration, Silver Spring, Md., Air Resources Lab.

ATMOSPHERIC TRANSPORT AND DIFFUSION IN THE PLANETARY BOUNDARY LAYER. *ESSA-TM-ERLTM-ARL-14, 44p., June 1969. 12 refs.*

NTIS: ERL-TM-ARL-14

Research at the Air Resources Lab, Silver Spring, Md. and at the National Reactor Testing Station was reviewed. The dominant period of air parcel oscillation in the vertical within the planetary boundary layer was estimated from peaks in vertical velocity spectra derived from 40 tetroon (balloon) flights in the vicinity of the 460-m BREN tower at the Nevada Test Site. The atmospheric lapse rate at mean tetroon height was determined from the temperatures obtained at several levels on the tower. Reasonable good agreement between the dominant period as a function of lapse rate and the Brunt-Vaisala period was obtained. The wind profile and turbulence structure were investigated, based on data from a tall tower. Concepts usually applied to the atmosphere s surface boundary layer over smooth and regular terrain seemed applicable to deep layers over rough and irregular terrain. Modifications of an infrared hygrometer were completed. The hygrometer s ability to hold dry-point and calibration when subjected to environmental thermal and wind stresses was determined. The hygrometer performed well; the dry-point reading remained unchanged, and calibration was verified. A check on the validity of using a uranium dye derived deposition and diffusion climatology for estimating deposition and diffusion of molecular iodine was attempted. The technique is not reliable except under the most steady meteorological conditions. Use of wind direction and velocity data was proposed for the study of mesoscale wind circulations as well as transport and dispersion. Other research topics included the feasibility of an automatic tetroon release system, a statistical technique for surface wind forecasting, hemispheric dispersion, deposition and depletion studies, and turbulence analysis.

15973 APTIC NO. 33471

Artemova, N. E.

A POTENTIAL METHOD OF EVALUATION OF AVERAGE DAILY CONCENTRATION OF A CONTAMINANT IN ASURFACE ATMOSPHERIC STRATUM. *(Vozmozhnyy method otsenky sredney sutochnoy kontsentratsii primesi v prizemnom sloe vozdnkha). Text in Russian. Tr. Inst. Priklad. Geofiz. (Leningrad), no. 4:65-72, 1967. 8 refs.*

The relations between instantaneous and average daily concentration of a contaminant emitted into the atmosphere by an industrial source are discussed. The empirical coefficients for conversion from instantaneous to average daily concentration are determined. The basis for the calculation of these coefficients is an analysis of regularities in a change of wind direction during the day. The mechanism of these changes was studied for 58 days. The wind direction was evaluated for every 20 minutes (an instantaneous direction). These grouped for every 20 degree angle and the total frequency of wind direction in the 20 degrees was calculated for each day. This yielded frequency of the wind of a given direction. Four basic changes in wind direction were observed (from very steady to rapid changes in direction up to 180 degrees). The ratio of average daily and instantaneous concentrations of contaminant decreased slightly with distance from the source. A good approximation of the average daily concentration of the pollutant is about 0.5 of the instantaneous concentration of a distance of one to three km from the source. When all types of wind direction changes are considered, the average daily concentration is equal to 0.35 times the instantaneous concentration for the same distance.

15974 APTIC NO. 33471

Artemova, N. E.0

A POTENTIAL METHOD OF EVALUATION OF AVERAGE DAILY CONCENTRATION OF A CONTAMINANT IN A SURFACE ATMOSPHERIC STRATUM. *(Vozmozhnyy method otsenky sredney sutochnoy kontsentratsii primesi v prizemnom sloe vozdnkha). Text in Russian. Tr. Inst. Priklad. Geofiz. (Leningrad), no. 4:65-72, 1967. 8 refs.*

The relations between instantaneous and average daily concentration of a contaminant emitted into the atmosphere by an industrial source are discussed. The empirical coefficients for conversion from instantaneous to average daily concentration are determined. The basis for the calculation of these coefficients is an analysis of regularities in a change of wind direction during the day. The mechanism of these changes was studied for 58 days. The wind direction was evaluated for every 20 minutes (an instantaneous direction). These grouped for every 20 degree angle and the total frequency of wind direction in the 20 degrees was calculated for each day. This yielded frequency of the wind of a given direction. Four basic changes in wind direction were observed (from very steady to rapid changes in direction up to 180 degrees). The ratio of average daily and instantaneous concentrations of contaminant decreased slightly with distance from the source. A good approximation of the average daily concentration of the pollutant is about 0.5 of the instantaneous concentration of a distance of one to three km from the source. When all types of wind direction changes are considered, the average daily concentration is equal to 0.35 times the instantaneous concentration for the same distance.

15975 APTIC NO. 33536

Atlas, David

ULTRA-HIGH RESOLUTION ATMOSPHERIC RADAR PROBING. *Preprint, National Academy of Sciences - National Research Council, Washington, D. C., 12p., 1970. 5 refs. (Presented at the National Academy of Sciences, Annual Meeting, 107th, Washington, D. C., April 27-29, 1970.)*

The recent development of a high sensitivity FM-CW radar with range resolution of only one m has opened up a wide range of hitherto invisible atmospheric phenomena to microscopic examination. Though limited to regions of sharp refractive index, the use of this technique promises advances in meteorological knowledge comparable to those in medicine resulting from x-ray fluoroscopy. For example, the marine inversion over San Diego has been detected routinely in the form of remarkably thin echo strata, sometimes thinner than the one m resolution, and having reflectivities 10 to 100 times stronger than previously observed. The inversion and other detectable strata nearby are frequently marked by long period gravity waves, and by shorter period breaking waves. The latter clearly show the sequence of wave amplification, vortex formation, and final breakdown to turbulence. Immediate application to monitoring of the depth of the mixing layer for air pollution prediction should be considered. (Author abstract modified)

15976 APTIC NO. 34010

Bailey, B. S.

GASOLINE COMPOSITION AND ATMOSPHERIC REACTIVITY. *American Petroleum Institute, New York, Div. of Refining, Proc. Am. Petrol. Inst. Div. Refining, vol. 51:936-943, 1971. (Presented at the Mid-Year Meeting, 36th, San Francisco, Calif., May 12-14, 1971.)*

The photochemical reactions which vehicle emissions undergo after reaching the atmosphere are described, and some of the problems involved in assessing the effect of gasoline composition on the photochemical reaction system and its environmental manifestations are outlined. These reactions are initiated by the photochemical dissociation of nitrogen dioxide by sunlight. Subsequent chemical reactions involving hydrocarbons and other organic substances result in the production of many products which include ozone, the peroxyacetyl and benzoyl nitrates, aldehydes, and aerosols. The reactivities of organic substances in photochemical reactions can be considered from many viewpoints; rates of disappearance of the organic substances, rates of conversion of the nitrogen oxides, and rates or maximum yields of various products have all been proposed and used as parameters indicating chemical reactivity. Eye irritation, various types of plant damage, aerosol formation, and visibility reduction have also been used as indicators of another kind of reactivity which can best be described as an environmental effect reactivity.

15977 APTIC NO. 34132

Barrett, C. F., L. E. Reed, and S. C. Wallin

THE USE OF AN EXPERIMENTAL CHIMNEY TO DETERMINE THE VALIDITY OF WIND TUNNEL TESTS. *Warren Spring Lab., Stevenage (England), Rept. LR 123 (AP), 106p., 1970. 11 refs.*

An investigation was undertaken to compare dispersion from an experimental chimney with results obtained from a model in a wind tunnel. The diameter of the chimney was 0.61 m and its height could be varied in 2.44 m increments from 14.6 to 26.8 m. The plume was marked with smoke and measured photographically. Model tests were conducted in a tunnel with a low level of turbulence at a scale of 1/96. The plume in the tunnel was narrower than at full scale but in most cases the position of the lower edge was in reasonable agreement; poorest agreement occurred when the wind direction was normal to a building very long in relation to its height. In some tests turbulence was introduced into the tunnel fairly crudely without improving agreement. (Author summary modified)

15978 APTIC NO. 34182

Barry, P. J.

USE OF ARGON-41 TO STUDY THE DISPERSION OF STACK EFFLUENTS. *International Atomic Energy Agency, Vienna (Austria), Nucl. Tech. Environ. Pollut., Proc. Symp., Salzburg, Austria, 1970, p. 241-255. 5 refs. (Oct. 26-30, Paper IAEA-SM-142a/13.)*

Since 1963, the concentration of Ar-41 emitted from a reactor stack has been measured continuously at ground level at several sites. The field concentrations are normalized to unit emission rate by dividing by the rate of emission at the stack which is also measured continuously. The normalized field concentration is a measure of the turbulent diffusivity of the atmosphere between the stack and the sampling site. A simple model of turbulent atmospheric diffusivity was described which is applicable to some of the problems of air pollution control. The model requires some knowledge of two probability distribution parameters: the long-term average diffusivity and the frequency of wind in the direction of the point of interest. (Author abstract modified)

15979 APTIC NO. 33436

Berlyand, M. Ye.

DANGEROUS CONDITIONS OF POLLUTION OF THE ATMOSPHERE BY INDUSTRIAL DISCHARGES. *In: American Inst. of Crop Ecology Survey of USSR Air Pollution Literature. Air Pollution in Relation to Certain Atmospheric and Meteorological Conditions and Some of the Methods Employed in the Survey and Analysis of Air Pollutants. M. Y. Nuttonson (ed.), Vol. 6, Silver Spring, Md., American Institute of Crop Ecology, 1971, p. 15-27. 11* refs. (Also: Tr. Gl. Geofiz. Observ. (Leningrad), no. 185:15-25, 1966.)

NTIS: PB 198527

The initial ascent of impurities from smokestacks is studied as a function of turbulent exchange and the temperature gradient in the atmosphere. Conditions are indicated for which the initial ascent of the impurity in the presence of a temperature inversion may be slight. In cases where such conditions are associated with low wind velocities, an abnormally dangerous situation arises in which the surface concentrations of the impurity reach very high values. (Author abstract)

15980 APTIC NO. 33506

Berlyand, M. Ye., Ye. L. Genikhovich, V. P. Lozhkina, and R. I. Onikul

NUMERICAL SOLUTION OF THE EQUATION OF TURBULENT DIFFUSION AND COMPUTATION OF ATMOSPHERIC CONTAMINATION NEAR INDUSTRIAL PLANTS. *Tr. Gl. Geofiz. Observ. (Leningrad), no. 138:3-17, 1963. 20 refs. Translated from Russian in: Soviet Investigations of Atmospheric Pollution, p. 1-20, Nov. 9, 1964. Joint Publications Research Service, Washington, D. C.*

NTIS: JPRS 27-279

A numerical solution of the problem concerning turbulent diffusion of a weightless admixture in the boundary layer of the atmosphere from a point source was given allowing an investigation of the conditions affecting the distribution of gases and finely divided dust ejected from the smoke stacks of the industrial enterprises. A number of control methods of the solution were claimed. Examples showing the calculation procedure with the aid of an electronic computer were given. An analysis of the results was also given. (Author abstract modified)

15981 APTIC NO. 33513

Berlyand, M. Ye.

ON THE THEORY OF TURBULENT DIFFUSION. *Tr. Gl. Geofiz. Observ. (Leningrad), no. 138:31-37, 1963. 6 refs. Translated from Russian in: Soviet Investigations of Atmospheric Pollution, p. 37-45, Nov. 9, 1964. Joint Publications Research Service, Washington, D. C.*

NTIS: JPRS 37-279

A mathematical solution of the problem pertaining to the turbulent diffusion of admixtures in the boundary layer of the atmosphere from point and linear sources were obtained. It was taken that the wind velocity increases with altitude in accordance with exponential law. A mathematical model was proposed for the horizontal component of the exchange coefficient.

15982 APTIC NO. 33862

Bolin, B.

CHANGES IN THE CARBON-DIOXIDE CONTENT OF THE ATMOSPHERE - A GLOBAL AIR POLLUTION PROBLEM. *Statens Naturv. Forskningsrads Arsbok, 1966:134-146. Translated from Swedish by T. C. Marwick, National Lending Library for Science and Technology (England), Meteorological Office, 13p., May 29, 1970.*

The carbon dioxide content of the atmosphere is reviewed with regard to natural changes and man-made air pollution. The CO2 in the atmosphere is assimilated by the plant world and restored in an approximately equal amount through decomposition. Approximately 0.05 billion tons (BT) are converted annually; amounts of carbon in the form of living plants and dead plant material are about 1.5 and 3.0 BT, respectively. Radioactive carbon is assimilated in all organic matter in proportion to the C14 content of the atmosphere. The C14 content diminishes about 1% in 80 years in the organic substance after assimilation stops. The sea contains about 115 BT of CO2 in the form of carbonic acid, bicarbonate, and carbonate ions. The rate of exchange of CO2 between the air and the sea is expressed as the decrease of C14 in the air and its increase in the sea. The CO2 content of the atmosphere has increased from 290 ppm in 1850, to 316 ppm today, and should increase to about 400 ppm by 2000. The role of CO2 in the earth radiation balance and the influence of changes in CO2 content on the earth climate are reviewed. The CO2 content as a function of latitude, seasonal variations, and local variations is examined.

15983 APTIC NO. 33919

Borgese, Domenico, Vittorio Giovanardi, and Marcello Pagliari

SIGNIFICANCE OF ATMOSPHERIC DIFFUSION IN THE DESIGN OF CHIMNEYS FOR THE GREAT THERMOELECTRIC PLANTS. *(Rilievi della diffusione atmosferica per il progette delle ciminiere di grandi centrali termo-elettriche). Text in Italian. Termotecnica (Milan), 21(12):657-664, Dec. 1967. (Presented at the National Congress ATI, 21st, Padova, Italy, Sept. 28-Oct. 1, 1966.)*

A series of tests was carried out for three years in Italy in order to determine the correlation between theoretical pollution levels induced by the fumes emitted by chimneys of thermoelectrical plants and the actual average pollution levels in the areas around these plants. The levels of air pollution were also investigated at sites where new plants will be built in the future. Methods for determining the levels of sulfur dioxide, nitrogen dioxide, hydrogen sulfide, and lead in the air as well as procedures for the determination the parameters of atmospheric diffusion (temperature and wind velocity), have been established. Early results indicate that the effedtive pollution levels around thermoelectric works are more than 10 times lower than the theoretical levels. The maximum concentrations of H2S in the vicinity of such plants is on the order of hundreds of one part per million (these levels occur only for brief time periods and are related to wind frequency). Dust levels are also very low, a graph concerning the dispersion of SO2 is also presented but no definite results are given.

15984 APTIC NO. 33320

Byzova, N. L.

ON THE CHOICE OF DIFFUSION COEFFICIENTS IN THE SOLUTION OF SEMI-EMPIRICAL EQUATION FOR POINT SOURCE. *(O vybore koeffitsientov diffuzii pri reshenii poluempiricheskogo uravneniya dlya tochechnogo istochnika). Text in Russian. Tr. Inst. Priklad. Geofiz. (Leningrad), no. 4:48-55, 1967. 22 refs.*

The calculation of characteristics of turbulent diffusion from atmospheric characteristics of turbulency is considered. Various assumptions made in the use of differential equations for turbulent diffusion in different works are discussed. The relation between semi-empirical and statistical methods of analyses is discussed. The application of statistical methods reveals the physical meaning of the coefficients of semi-empirical equations; statistics can be used for the well-founded choice of these coefficients in the description of a given process.

15985 APTIC NO. 33322

Byzova, N. L. and Yu. S. Osipov

ON THE DIFFUSION OF A CONTAMINANT FROM THE POINT SOURCE IN A TRANSVERSE DIRECTION TO THE WIND. *(Orasseyanii primesi ot tochechnogo istochnika vnapravlenii poperechnom vetru). Text in Russian. Tr. Inst. Priklad. Geofiz. (Leningrad), no. 4:56-64, 1967. 16 refs.*

The results of two experiments on diffusion from a high-level point source are presented. These experiments were carried out under the same conditions except for the difference in the length of action of the contaminating source. The standard deviation of normal distribution of deposition density with distance in the case of the source of longer duration exceeded that of the source of short duration. The dispersion depended on the wind direction in a lower 300 m stratum during internal and external averaging periods. During steady, average winds, the increase in the dispersion ceased when the external averaging period was one hour.

15986 APTIC NO. 33543

Byzova, N. L. and Yu S. Osipov

ON THE SPREAD OF A HEAVY CONTAMINANT IN A LOWER ATMOSPHERIC STRATUM DURING INVERSIONS. *(O rasprostranenii tyazheloy primesi v nizhnem sloe atmosfery pri inversiyakh). Text in Russian. Tr. Inst. Priklad. Geofiz. (Leningrad), no. 2:65-73, 1965. 10 refs.*

Two experiments were made under inversion conditions. The parameters of the trace of contaminant depositions (location, length, width, and maximum density of depositions) were related to meteorological parameters. The height of the contaminating source (aerosols of gravitational sedimentation rate of 0.005-0.3 m/sec) was 50-300 m, the length of its action was 10-40 min. Measurements of wind velocity, temperature, wind direction, and changes in wind direction enabled the determination of a parameter of surface-layer stratification, the height and intensity of the lower and upper limit of the inversion, and the velocity and direction profile of the wind in the stratum connecting source and surface where the contaminant was collected. To analyze the spread of the contaminant during the inversion, the solution of two equations for turbulent diffusion was used under two assumptions: the coefficient of vertical turbulent diffusion increases linearly with height; it is independent of the height of the stratum. Thus, the mechanism of transverse diffusion was determined. Maximum deposition density and its occurrence was also calculated. Comparison of the diffusion parameters with meteorological conditions gave a semi-empirical relation which allows the calculation of diffusion parameters from meteorological conditions. The formulas derived for non-inversion stratification can be used for inversions with an error not exceeding experimental error.

15987 APTIC NO. 33673

Cinkotai, F. F.

THE BEHAVIOUR OF SODIUM CHLORIDE PARTICLES IN MOIST AIR. *J. Aerosol Sci., 2(3):325-329, Aug. 1971. 2 refs.*

The ratios of the diameter of sodium chloride solution droplets to the diameter of NaCl particles from which the droplets were formed were computed for various humidities. Graphs of the ratio versus particle diameter at various relative humidities and the ratio versus the relative humidity at various particle diameters are presented and discussed. The graphs showing the ratio versus particle diameter at various humidities indicate that NaCl particles less than one micron in diameter may, at a given supersaturation, form stable droplets with two different diameters and composition. The graph of ratio versus relative humidity (rh) for particles larger than one micron shows that the diameter of a NaCl solution droplet changes enormously between 99 and 100% rh. The diameter of these droplets will, therefore, serve as a sensitive measure of rh in the 99 and 100% region. The curves presented are directly applicable to inhalation work since they were calculated for particles and solution droplets at the temperature of the human body. (Author abstract modified)

15988 APTIC NO. 34104

Collins, D. G. and M. B. Wells

COMPUTER PROCEDURES FOR CALCULATING TIME DEPENDENT LIGHT SCATTERING IN PLANE PARALLEL ATMOSPHERES. *Radiation Research Associates, Inc., Ft. Worth, Tex., Defense Atomic Support Agency Contract DASA01-68-0169, Proj. NWER XAXH, Task C062, Work Unit 06, Rept. RRA-T7016 Rept. DASA 2641, 65p., April 1971. 10 refs.*

NTIS, DDC: Ad 722714

Two Monte Carlo procedures were developed as calculational tools for studies of the transport of visible and infrared light in plane-parallel atmospheres. The procedures, TPART-T and TPART-II, treat atmospheric scattering problems for point and plane parallel monochromatic sources, respectively. They consider the effect of Rayleigh and aerosol scattering and ozone, water vapor, carbon dioxide, and aerosol particle absorption on light transport, plus changes in polarization occurring at each scattering event. The input format of the codes permits atmospheric scattering and absorption properties to be described as a function of altitude. Provisions are incorporated for treating the ground surface with an albedo method. Output of the codes gives the scattered light intensity at each receiver position as a function of a polar and azimuth angle and time. The codes were written in FORTRAN-IV for the CDC-6600 and IBM Direct Couple Systems. They have been verified though comparisons with results of other calculations of light transport. (Author abstract modified)

15989 APTIC NO. 33761

Conn, Robert and Lawrence T. Papay

WASTE HEAT AND FOG CONTROL. *Nuclear Technol., 12(3):268-275, Nov. 1971. 17 refs.*

In southern California, advection fogs formed at sea roll in and over coastal areas from November to April, making air transportation and high-speed highway travel dangerous. The mechanism of fog formation is directly related to the existence of a cold band of water (several miles wide) which plays a catalytic role in the sequence of steps leading to fog formation. One way of preventing an advection fog is use of reactor waste heat to make the band temperature similar to the surrounding water temperature. Without the cold band to induce condensation, the nearly saturated air should reach land without condensing, and the required temperature increase of one to four degrees F should have minimal impact on the ecological system. An estimate of the installed electrical megawatts required to heat the band is given. Reactor waste heat could also be used to reduce the intensity (thereby improving visibility) in an existing fog. As determined by a mathematical model, a strongly nonlinear gain in visibility is achieved as the sea surface temperature (temperature at the fog base) is raised. The offshore siting of nuclear industrial complexes and airports would enhance the feasibility of both approaches.

15990 APTIC NO. 33369

Coulson, K. L.

ON THE SOLAR RADIATION FIELD IN A POLLUTED ATMOSPHERE. *J. Quant. Spectr. Radiative Transfer, 11(6):739-755, June 1971. 35 refs.*

Measurements of the fields on intensity and polarization of radiation from the sunlit sky, made in the heavily polluted atmosphere of Los Angeles, are compared with similar measurements obtained in Davis under particularly clear atmospheric conditions, and with computed fields for selected atmospheric models. Data for a thick stratus overcast are also included. The measurements are in six spectral intervals from the ultraviolet to the near infrared, the intervals being defined by interference type optical filters in combination with a photomultiplier tube having an S-20 response. The results show that both the intensity and polarization fields are strongly affected by aerosol scattering. The solar aureole, which is confined to the vicinity of the sun in a clear atmosphere, is spread out to cover most of the sky in the polluted atmosphere, and the skylight intensity is correspondingly increased. Near the horizons, however, the intensity is strongly decreased by atmospheric pollution. The degree of polorization is decreased by a factor of about two for the polluted case, but the general polorization distribution over the sky is not greatly changed otherwise. The positions of the neutral points in the ultraviolet are shifted from their measured positions in a clear atmosphere, the Babinet point being shifted by as much as 10 deg toward the sun and the Arago point by up to 8 deg toward the anti-sun by the effects of pollution. At the longer wavelengths the Babinet and Brewster points are completely eliminated by aerosol scattering. For the case of heavy stratus overcast, the degree of polorization becomes quite small (generally less than one or two percent), no neutral points are evident, and strong horizon darkening occurs at all wavelengths. Computations based on the Mie theory for semi-realistic models of the turbid atmosphere and of clouds reproduce many of the observed characteristics, but there are some important discrepancies between the observed and computed fields. (Author abstract)

15991 APTIC NO. 34137

Cox, William M. and Charles E. Zimmer

STATISTICAL EVALUATION OF DATA. *In: Interstate Surveillance Project: Measurement of Air Pollution Using Static Monitors. Air Pollution Control Office, Research Triangle Park, N. C., Interstate Surveillance Project and Resources Research, Inc., APCO Pub-APTD-0666, p. 47-58, May 1971.*

NTIS: PB 200519

Data gathered through the Interstate Surveillance Project was statistically evaluated with respect to interrelationships between components, effects of meteorological conditions, and relationships between components and air quality data. The correlations among the components were generally positive, suggesting that highly polluted areas tend to be contaminated by most types of pollutants. Gross effects of meteorology were determined from annual averages for components and of wind velocity, relative humidity, degree days, temperature, and precipitation. The most significant correlations between components and air quality data were determined for the average SO2 concentrations and lead candle sulfations. Factor analysis, factor-score matrix, and the performance of individual components were examined.

15992 APTIC NO. 34103

Davidson, Ward F.

THE DISPERSION AND SPREADING OF GASES AND DUSTS FROM CHIMNEYS. *Industrial Hygiene Association of America, Inc., Pittsburgh, Pa., Trans. Ind. Hyg. Found., Annu. Meet., 14th, 1949, p. 38-55. 22 refs.*

Available data and information on the dispersion and spreading of gases and fine dusts discharged into the atmosphere from chimneys are summarized. The airflow in the atmosphere varies in speed and direction. The influence of aerodynamic factors usually diminishes rapidly with distance from the chimney; these factors are generally the controlling ones in determining the path of the smoke plume or gas trail to the point where it seems to level off and follow the general wind. The effect of exit velocity and excess temperature of the chimney gases above the atmosphere are often of considerable importance. They may carry the plume beyond the wake or zone of turbulence created by the chimney and the associated buildings, or they may cause the gases to penetrate an inversion ceiling in the atmosphere. The influence of terrain varies greatly. It is of first importance in hilly or mountainous country but is less important in level country. The influence of buildings is such that it can rarely be ignored in the studies of atmospheric pollution from industrial sources. The obvious meteorological factors are wind speed and direction, with information as to frequency and persistance. Air temperature and humidity might also be included. Theories of diffusion are presented. Atmospheric phenomenon such as inversion and the effects of wind on inversions are also discussed.

15993 APTIC NO. 33755

Dyer, A. J.

THE PHYSICAL BASIS OF CLIMATIC CHANGE. *Aust. Phys., 8(8):113-117, Aug. 1971.*

The atmosphere is a vast heat engine deriving its energy from the sun. A small amount of radiation is absorbed in the stratosphere, producing the ozone layer; the remainder penetrates to the lower atmosphere, where some is reflected by clouds, some is scattered by air molecules and aerosols, ans some penetrates to the surface. The net interchange of radiation energy at the surface is distributed in heating the air near the surface (a flux of sensible heat), in evaporating water (a flux of latent heat), and in warming the ground. The main energy input to the atmosphere is thus in the surface fluxes of sensible and latent heat which eventually produce the weather systems circling the globe. The response of world temperature to changes in the radiation balance are examined. The competing effects of warming due to carbon dioxide input to the atmosphere and cooling due to particulate input must be considered in making future projections. Requirements of numerical atmospheric models for predicting climate modifications are summarized.

15994 APTIC NO. 33490

Eggleton, A. E. J. and N. Thompson

LOSS OF FLUORESCENT PARTICLES IN ATMOSPHERIC DIFFUSION EXPERIMENTS BY COMPARISON WITH RADIOXENON TRACER. *Nature (London), 192(4806):935-936, Dec. 9, 1961. 4 refs.*

Zinc cadmium sulfide, disseminated in a finely ground particulate form mainly in the size range 1-5 micron, has been widely used as a tracer in work on diffusion and atmospheric pollution. When an apparent decrease in the number of airborne particles with increasing distances of travel was observed, it was decided to compare the fluorescent tracer directly with an inert gaseous mixture. Radioactive xenon-133 was selected because of ease of sampling and detection. On each of three days, approximately 10 kgm of zinc cadmium sulfide and 3 curies of xenon-133 were emitted from a 20-m incinerator stack over a period of about two hours beginning near noon. Wind directions varied between south-west and west-north-west with mean speeds of between 4 and 7 m/sec. Vigorous convection extended to heights of up to 1700 m; there was about one-half cloud cover present. Both tracers were sampled at two stations, one about 16 km and the other about 60 km from the source. The mean loss of particles in travelling between the two sampling stations was approximately 50%. Separate studies of the size spectrum of the particles after different distances of travel showed an apparent decrease in the proportion of small particles with increasing distances of travel.

15995 APTIC NO. 34105

Eiden, R., G. Eschelbach, G. Haenel, and K. Bullrich

RESEARCH ON ATMOSPHERIC OPTICAL RADIATION TRANSMISSION. JAN. 1, 1969 - DEC. 31, 1970. (INTERIM REPORT). *Johannes Gutenberg Univ., Mainz (West Germany), Inst. Fuer Meteorologie, Air Force Cambridge Research Labs. Contract F-61052-69-C-0016, Proj. 7621-03, 62101F, AFCRL 71-0184, 81000, 84p., Jan. 1971. 38 refs.*

NTIS, DDC: AD 722538

A four-part study was conducted of atmospheric optical radiation transmission. A solution to the equation of radiative transfer in a turbid atmosphere was obtained by direct integration of the equation without any circuitous series development. The method is suitable for investigating the influence of such optical parameters as turbidity, albedo, stratification, and absorption on radiation, on degree of polarization and on radiant fluxes. Methods of obtaining optimal information on optical properties of spherical aerosol particles were determined. They are measuring the degree of polarization, the ellipticity, and the position of the ellipse described by the electrical field vecotor of the polarized portion of the scattered light. The influence of the properties is most significant in the range of backward scattering. Extinction coefficients of atmospheric aerosol particles due to changes of relative humidity were calculated together with extinction coefficients of particles with different complex refractive indices. The dependence of the visual range on relative humidity is a helpful tool for studying precondensation. The dependence on moisture is due to the fact that water vapor condenses on atmospheric suspensoids with increasing relative humidity. With decreasing relative humidity, water evaporates from these particles. Estimating aerosol particle-size distribution from measurements of spectral extinction requires the exact value of the complex refractive index because the latter is a tight function of the relative humidity.

15996 APTIC NO. 33888

Ellison, William, Robert E. Sommerlad, and Richard M. Mark

CONDITIONING, DISCHARGE AND DISPERSION OF WATER-SATURATED STACK GASES FROM WET SCRUBBERS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 37p., 1971. 29 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 64th, Atlantic City, N. J., June 27-July 2, 1971, Paper 71-128.)*

The analytical and experimental means to develop a plume-rise formula for wet scrubber emissions are outlined which would permit the engineer to relate the design characteristics of the wet collector system to the residual-pollutant-dispersion characteristics of the discharged gas under specified atmospheric conditions. Practical engineering aspects and examples of scrubbing-liquid mist-elimination, wet-gas re-heating, control of diverse sources of liquid phase material in the stack discharge, and of other design factors relating to pollutant dispersion are reviewed. In the absence of a reliable technique for predicting aerodynamic behavior of water-saturated stack gas emissions and for quantitatively relating this to the characteristics of wet-collector systems, the fullest utilization of versatile wet scrubber systems for sulfur dioxide and particulate emission control in the electric utilities industry may be hindered. The success of current and pending commercial installations for such very large volume sources, working within practical plot space limitations and achieving suitable plume trajectory and aerodynamics, will be increased by the use of the most advanced and reliable techniques for the detailed design and engineering of system components including the scrubber, separator, mist eliminator, blower, breeching, stack and gas re-heat facilities as required. (Author abstract modified)

15997 APTIC NO. 34221

Ernest, Terry Eugene

MECHANISTIC STUDY OF AIR POLLUTION. *Univ. of Southern California, Los Angeles, Dept. of Chemical Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1969, 98p. 28 refs.*

Postulated mechanisms of Los Angeles-type smog were studied by assigning reasonable estimated rate constants to each reaction step and comparing the predicted results with experimental evidence. A new mechanism for the production of smog is proposed, which predicts within reasonable accuracy the reactant and product changes with time of the reaction of propylene in an irradiated system containing oxygen, nitric oxide, and nitrogen dioxide. This mechanism depends for its success on free radical chain reactions.

15998 APTIC NO. 33939

Fortak, Heinz G.

NUMERICAL SIMULATION OF TEMPORAL AND SPATIAL DISTRIBUTIONS OF URBAN AIR POLLUTION CONCENTRATION. *National Air Pollution Control Administration, Research Triangle Park, N. C. and North Carolina Consortium on Air Pollution, Proc, Symp. Multiple-Source Urban Diffusion Models, Chapel Hill, N. C., 1969, p. 9.1-9.34, 14.8. 20 refs. (Oct. 27-30.) (APCO Pub. AP-86)*

NTIS: PB 198400

A multiple-source diffusion model for the simulation and prediction of long-term (climatological) ground-level sulfur dioxide concentrations in urban areas is described. The computer input consists of data from an emission source inventory together with statistics on relevant diffusion parameters. Because of the capacity of available computers, only a limited number of the largest emission sources can be treated individually. Smaller industrial emission sources are treated as residential sources. These are represented by a large number of stacks of the same dimensions for which the mean area emissions have been estimated. The meteorological input consists of data on wind direction, wind speed, and stability. The program also uses corresponding statistics for urban boundary layer depths and values for parameters affecting absorption at the earth's surface. The diffusion model used is basically Gaussian. It is modified, however, such that turbulent diffusion is restricted exclusively to the depth of the urban boundary layer. The rate of decay of sulfur dioxide is also taken into account. The model calculates fields of steady-state ground-level concentrations that correspond to a given spatial distribution of emission sources and to any possible combination of relevant meteorological diffusion parameters. Knowledge of frequency distributions of these meteorological diffusion parameters permits the derivation of frequency distributions of ground-level concentrations for any location within or outside of the metropolitan area. The computerized experiments simulate frequency distributions of ground-level concentrations for a great number of regularly arranged grid points (up to 2500 with a mesh size of 500 by 500 meters) and for a variety of time periods (months, heating period, seasons of year). Experiments to validate the model were conducted during the heating period in 1967-68 at four continuous monitoring stations that had been installed at special locations within the limits of the metropolitan area of Bremen. (Author abstract)

15999 APTIC NO. 34271

Furuhama, S. and Y. Tateishi

GAS COMPOSITION OF TOPLAND AREA OF A PISTON. *(Pisuton toppurando-bu no gasu seibun). Text in Japanese. Preprint, the Society of Automotive Engineers of Japan, Inc., Tokyo, p. 43-54, May 1971. 6 refs. (Presented at the Society of Automotive Engineers of Japan, Academic Conference, Tokyo, Japan, May 1971.)*

Thermodynamic calculations were made of gas composition of the mix gas in the topland area of a piston, ignoring the actual chemical transformation of the gas. For the calculation purposes, the topland section and the back of the top ring were regarded as separate chambers, and it was assumed hypothetically that a perfect mixture of gas was achieved instantaneously in each chamber. It was further assumed that from the time of ignition until the time of the maximum pressure point, a proportionate amount of combustible gas mixture would flow into each chamber, and after the maximum has been reached, from the back of the ring to the topland and from the topland to the combustion chamber, a counter-flow would occur. Various conditions were applied to the equations for fuel gas concentration, inorganic gas volume ratio, and hydrocarbon quantity, and the results of calculations were presented in graphs and tables. At 1300 cc, the four-cylinder, gasoline engine was used for experiments, and gas from the piston topland area was sampled and analyzed by gas chromatography. The apparatus for gas sampling was made with an electro-magnet valve, and the behavior of the valve was observed by an oscillograph. The experiments revealed that the actual measurements of carbon dioxide, carbon monoxide and oxygen coincided with the calculations, but the absolute figure of hydrocarbon was very small and presented a question. In the topland area, some low-molecule HC were created by chemical reaction, but the amount was small and mostly remained in the form of fuel.

16000 APTIC NO. 34039

Garnett, Alice

WEATHER, INVERSIONS, AND AIR POLLUTION. *Clean Air, 1(3):16-21, Autumn 1971. 1 ref.*

The correlation between certain meteorological conditions and the incidence of air pollution was investigated. Severe conditions of winter inversion of temperature determined for a hilly urban environment spurred the continuity of sulfur dioxide and smoke pollution. Conditions of prolonged winter anticyclonic weather also coincided with the occurrence of ground fog. Fog either prolonged the inversion of temperature or caused more effective deep mixing of the ground layers, despite inversion conditions, so that pollution at ground level concentrations was dispersed and reduced. High pulses of smoke pollution (fumigation) occurred simultaneously with the lapse rate of temperature, vertically, breaking from positive to negative values as stable air was changing to neutral or unstable conditions. The bases of inversion layers were determined. Other weather conditions, notably stagnant warm or cold fronts, were significantly correlated with unfavorable pollution conditions. The formation of stratus clouds in relation to turbulent and smoother air flow and the development of high inversion levels within the first 2000 ft characterized some coastal climates.

16001 APTIC NO. 33326

Gatz, Donald F.

SULFUR DIOXIDE POLLUTION CHARACTERISTICS OF CHICAGO LAKE BREEZE CIRCULATIONS. *In: Radiological Physics Division Annual Report. Environmental Studies. Argonne National Lab., Ill., Radiological Physics Div., p. 121-136, 1970. 6 refs.*

NTIS: ANL-7660, Part III

Pollution patterns of sulfur dioxide hourly average concentrations during 1966 and 1967 Chicago lake breezes were examined for the incidence of SO2 concentrations greater than 0.15 ppm in lake breeze situations; the relative pollution levels at eight observing stations before and after the passage of the lake breeze front; and relative pollution characteristics of classic; and nonclassic lake breezes. In classic lake breezes, SO2 greater than 0.15 ppm occurred in about six percent of the station hours of lake air during both years of study. In 1966 and 1967, 14.5% and 5.9% of the nonclassic breezes occurred, respectively. Observed city-wide annual averages for the two years were 14.9% and 14.4%. For both lake breeze types, relative frequencies of SO2 greater than 0.15 ppm varied markedly with station location and season, being highest near sources and during winter. At stations near both SO2 sources and the lake shore, an intrusion of lake air usually resulted in a drop in hourly average SO2 concentration, except in cases where a station felt the effects of a lake breeze fumigation of strong local sources. Farther inland, SO2 concentrations rarely changed as the lake breeze front passed. At the stations, farthest inland the changes that did occur were increased hourly average concentrations. (Author abstract modified)

16002 APTIC NO. 33900

Georgii, H. W., D. Jost, R. Schmitt, and E. Weber

INVESTIGATIONS CONCERNING THE CHEMISTRY OF THE ATMOSPHERE AT ST. MORITZ-SPA. *(Untersuchungen zur Chemie der Atmosphaere in St. Moritz-Bad). Text in German. Z. Angew. Baeder- Klimaheilk., 17(1):21-29, 1970. 11 refs.*

In the summer of 1968, the concentration of air pollutants in the area of the Alpine spa St. Moritz was tested. The results show the influence of the wind direction in the course of a day. From the sulfur dioxide and hydrogen sulfide concentrations measured, the total sulfur content was determined. It amounted to an average of 4.0 micrograms of sulfur/cu m of air at northeasterly wind, and 2.8 micrograms sulfur/cu m at southeasterly wind. The total sulfur content is determined by the length time of the air dwells over areas of SO2 emission sources, in the present case 40 to 50 hours, from which the wind carries the air to the measuring points. Ozone concentrations of only 50 ppb were found on days of high SO2 concentrations, against 100 to 130 ppb in air with very low SO2 concentrations. In the evening, the ozone content invariably dropped to about 40 ppb. Dust concentration was measured by means of an apparatus with a moving filter band. Because of the general purity of air in St. Moritz, sample taking was extended over 12 hours for each test. The dust deposit on the filter was exposed to beta rays, and simultaneously rays from the same source were directed at a clean part of the filter. The difference in synchronous radiation decrease between the two sets of rays provided a basis for determining the dust concentration which averaged 20 to 25 micrograms/cu m, compared to values of 100 micrograms/cu m or higher which can be found in large cities.

16003 APTIC NO. 34089

Georgii, H. W.

NEW AERO-CHEMICAL INVESTIGATIONS IN PURE AIR. *(Neue luftchemische Untersuchungen in reiner Luft). Text in German. Bundesgesundheitsblatt (Berlin), 13(14):192-194, July 1970. 9 refs. (Presented at the Institut fuer Wasser-, Boden- und Lufthygiene des Bundesgesundheitsamtes, Methoden der Luftueberwachung und der Wirkungsbestimmung von atmosphaerischen Schadstoffen, Jan. 21-23, 1970.)*

Several gases are present in traces only in non-polluted air which, nevertheless, are of importance in connection with a number of problems concerning the physics of the atmosphere. Examples are water vapor, carbon dioxide, and ozone. Several methods permit determination of these components even in very small concentrations, and observation of the variations in concentrations depending on geographic conditions. In 1969, an expedition of the German exploration boat Meteor, backed by a number of research groups, was utilized for carrying out a program for determining concentrations of certain gases in the so-called pure air, such as sulfur dioxide and carbon dioxide. The boat traveled a south-north course in the Atlantic ocean at a longitude of 30 deg west, between the latitudes of 10 deg south and 60 deg north. The SO2 concentrations above the water surface varied from three micrograms/cu m at 40 deg north to zero in the equator zone. The sources for the SO2 are the continents, except for certain oceanic areas that give rise to hydrogen sulfide which, by oxidation in the air, is changed into SO2. With increased distance from the coast, the SO2 concentration diminishes. With regard to CO2, the expedition carried out measurements to determine the variations between 10 deg south and 60 deg north, the CO2 partial pressure in the seawater, and the vertical distribution of CO2 over the Atlantic by means of a newly developed balloon with sampling device. No absolute values are reported in the article, but certain phenomena are metioned, such as decrease of CO2 concentration with rising wind velocity, and sudden rise of recorded CO2 when entering the northern hemisphere.

16004 APTIC NO. 33892

Gerend, Robert P.

PENETRATION OF A JET INTO A NONUNIFORM STREAM. *Seattle Univ., Wash., School of Mechanical Engineering, Thesis (M.S.), June 1968, 130p. 12 refs.*

Most practical jet penetration problems involve penetration of a jet into a nonuniform mainstream velocity profile. All previous empirical or analytical methods for predicting the jet axis have been applied to the problem of a jet penetrating a uniform stream. An extension of Abramovich's semi-empirical theory to cover jet penetration into a nonuniform stream is described. The experiment performed to verify the revised theory is described and the experiment and theory are compared. The variation of jet penetration characteristics with mainstream Reynolds number is shown, and the measured jet spreading coefficients and thickness-to-width ratios are examined. These coefficients differ considerably from the values used by Abramovich in his analysis. The effects of using different coefficients on the jet trajectories predicted by the revised theory are discussed. The revised theory provides a good representation of the axis of a jet penetrating either a uniform or nonuniform turbulent stream. However, the empirical coefficients quoted by Abramovich are not necessarily representative of a round jet, even though, when used together in the numerical solution of the revised theory, they do provide a good representation of the jet axis due to self-compensating effects. Further analytical and experimental investigations of jet spreading characteristics are recommended to obtain correlations of jet spreading with variables such as mainstream Reynolds number and jet-to-mainstream dynamic pressure ratio. These correlations could be introduced into the revised theory to obtain more accurate predictions of jet trajectories. (Author abstract modified)

16005 APTIC NO. 34213

Gushchin, G. P.

ON THE ATMOSPHERIC OZONE. *(Ob atmosfernom ozone). Text in Russian. Gl. Upr. Gidrometeorol. Gluz., 1967:207-210. 7 refs.*

In keeping with the schedule provided by the International quiet sun year, maps of the horizontal distribution of ozone above the U.S.S.R. territory by seasonal and year-round average values were elaborated. The highest year-round average values were seen in Eastern Siberia and above the Maritime Territory. The minimal values were seen above the South-Western portion of the U.S.S.R. and in Central Asia. A latitudinal course of ozone was observed above these latter regions while a longitudinal trend was observed above the eastern portion of the U.S.S.R. Atmospheric ozone appears to be closely related to the location of the air stream flows: the left side of the subtropical and extratropical stream flows elicits higher levels of O3. The horizontal distribution of ozone is maintained year-round within its currents and is independent of the direction of the stream. The vertical distribution of ozone within the stream shows increased densities at approximately 9-20 km levels indicating that ozone density may be used as a tracer for the focusing of air streams or even aircrafts.

16006 APTIC NO. 33341

Halitsky, James

GAS DIFFUSION NEAR BUILDINGS. THEORETICAL CONCEPTS AND WIND TUNNEL MODEL EXPERIMENTS WITH PRISMATIC BUILDING SHAPES. *New York Univ., N. Y. Geophysical Sciences Lab., Rept. 63-3, 162p., Feb. 1963. 36 refs.*

Gas diffusion from a source near a building cannot be predicted with conventional diffusion formulas because the mean flow field near the building is distorted, and the turbulence is highly isotropic and nonhomogenous. However, wind tunnel model experiments were conducted which show that recognizable concentration patterns do occur, and may be described by isopleths of a non-dimensional concentration coefficient. Typical three- dimensional isopleth surfaces around characteristic building configurations are presented, and a method for using the isopleths to predict gas concentrations around full-size buildings is given. The usefulness of the isopleths in other configurations requires an understanding of flow patterns around sharp-edged buildings. An extended theoretical section is included to show the nature of these patterns and the physical concepts and mathematical terminology of turbulent diffusion. (Author abstract modified)

16007 APTIC NO. 34301

Ham, J. van and H. Nieboer

THE CHEMISTRY OF THE PHOTOCHEMICAL AIR POLLUTION. *(De chemie van de fotochemische luchtverontreininging). Text in Dutch. Chem. Weekblad, 67(32):F15-F19, Aug. 6, 1971. 20 refs.*

Photochemical air pollution results from reactions between nitrogen oxides, organic compounds, and oxygen under the influence of sunlight in the atmosphere. California smog is described. Chemical reactions associated with the nitrogen dioxide photolysis cycle are described. The role of organic ompounds is explained. The important criterion in this process are the speed of ozone formation; the speed of nitric oxide transformation to NO2; eye irritation; and speed of dispersion of hydrocarbons. Other variables such as temperature and relative humidity are important. Experimental results of smog chamber studies are described. To assess the smog situation in the Netherlands, the amounts of NO, NO2, hydrocarbons, and aldehydes are needed. Different methods of getting this data are described, along with the institutions working in this field. Research in the field of synthesis of peroxyacetyl nitrate (PAN) in the Netherlands is described. The harmful effects of PAN are explained.

16008 APTIC NO. 33399

Heldman, Dennis R.

A MATHEMATICAL MODEL FOR AEROSOL DIFFUSION AND DEPOSITION. *Trans. ASAE (Am. Soc. Agr. Engrs.), 14(2):229-231, March-April 1971. 5 refs. (Presented at the American Society of Agricultural Engineers, Annual Meeting, Lafayette, Ind., June 1969, Paper 69-377.)*

An approach to controlling airborne contamination in food-processing plants or similarly confined spaces is to move a stream of filtered air continuously over a protected surface for the immediate removal of any contamination generated in the space above the surface. The effectiveness of this laminar air-flow technique at locations downstream from a source of airborne contaminant was investigated. A model describing aerosol diffusion and deposition from a point source was developed and then applied to published data to determine the magnitude of diffusion coefficients to be expected in laminar air-flow spaces. Results show that the diffusion and deposition of a continuously generated bacterial aerosol from a point source in streamline air flow is described by a single mathematical expression. Diffusion of a bacterial aerosol in a laminar air-flow system operating at 100 ft/min is described by a convective diffusion coefficient of 0.015 sq ft/sec. Small changes in source height above a surface result in significant increases in distances from the source at which deposition begins. Rather large changes in aerosol generation rate are required to increase the distance0

16009 APTIC NO. 33829

Hiraoka, Masakatsu, Arimitsu Ikeda, and Hiroaki Todaka

A STUDY OF URBAN AIR POLLUTION AND METEOROLOGICAL ELEMENTS. *(Toshi iki taiki osen to kisho yoso ni kansuru ichi kosatsu). Text in Japanese. Preprint, Japan Society of Civil Engineers, Tokyo, p. 645-646, 1971. 2 refs. (Presented at the Japan Society of Civil Engineers, Scientific Meeting, Annual, 26th, Oct. 1971, Paper II-233.)*

The relationship of the macroscopic weather, the purification index, the intensity of emissions in an urban area, and the synoptic-scale and meso-scale meteorological conditions was studied to predict the density of air pollution over a given city or area. The purification index is a mathematical expression which considers the altitude, rainfall, pollution density, and size of the area. The pollution density under normal conditions is inversely proportional to the purification index. This theory was applied to the meteorological data recorded for the Osaka area. From this, it was determined that the height of the air volume becomes smaller with greater wind velocity½ The optimum height values for various districts were estimated.

16010 APTIC NO. 34113

Hosler, Charles R. and Thomas J. Lemmons

RADIOMETRIC MEASUREMENTS OF TEMPERATURE PROFILES IN THE PLANETARY BOUNDARY LAYER. *Preprint, Air Pollution Control Office Raleigh, N. C., Div of Meteorology, 27p., 1971 (?). 5 refs.*

A ground-based five-millimeter-wavelength radiometer, named the Radiometric Thermasonde-TM, has been developed. Typical vertical temperature profiles, derived from a recently developed radiometric data processing technique, are compared with profiles measured simultaneously by conventional techniques. Two years of performance testing of the operational prototype Thermasonde-TM have demonstrated the feasibility of using radiometric remote probing techniques to describe thermal stability conditions within the first 1.5 to 2.0 kilometers above the surface, during fair weather conditions. Preliminary tests indicate that temperature profiles derived from the Thermasonde-TM can provide useful information, particularly for air pollution meteorology and for describing dispersion characteristics within the planetary boundary layer. The evaluation of a preliminary data reduction technique is described. (Author abstract)

16011 APTIC NO. 33908

Huff, F. A. and S. A. Changnon, Jr.

URBAN EFFECTS ON DAILY RAINFALL DISTRIBUTION. *Preprint, American Meteorological Society, Boston, Mass., p. 215-220, 1970. 10 refs. (Presented at the National Conference on Weather Modification, 2nd, Santa Barbara, Calif., April 6-9, 1970.)*

The possible urban effects on precipitation in St. Louis and Chicago were studied. The frequency of heavy rainstorms and the frequency of rainfall by days of the week were examined. Evidence was found in both cities of a substantial increase in the frequency of heavy rainstorms downwind of the urban-industrial complexes. Through the use of a 14-gage urban raingage network in Chicago, evidence was also found of an increase in the frequency of heavy storms within the city compared with upwind suburban areas. Data from Major Effect Areas, defined as locations where urban-industrial effects on convective elements would be most evident, near St. Louis and Chicago revealed that on weekdays these areas experience 1-23% more rain days than occurred in upwind or downwind areas where urban effects are considered unlikely. In St. Louis, the Minor and Major Effects Areas experienced no rain-day increases on weekends, which when coupled with their weekday increases, strongly indicates an urban-industrial effect related to increased human and industrial activities on weekdays. Unlike St. Louis, the La Porte and Hobart (Chicago effect area) results show an increase on weekends as well as on weekdays. The weekend increases, in both rain days and rainfall amounts, are greater percentagewise than those on weekdays. The findings indicate that industrial effects are the principal cause of rain increases. The slightly greater increases on weekends, as opposed to weekdays, in the Chicago area further suggest that some optimum condition for effects must exist and that it is present more often on weekends than weekdays in the Chicago area. (Author conclusions modified)

16012 APTIC NO. 33547

Hughes, A. J., C. J. Oliver, E. R. Pike, and J. J. B. OShaughnessy

MEASUREMENT OF WIND VELOCITY BY LASER SCATTERING. *Roy. Radar Establ. Newsl. Res. Rev., no. 9:7/1-7/3, 1970. 2 refs.*

NTIS: N71-10208

Laser-Doppler methods are proving very convenient and successful in the measurement of fluid flow rates on small scales and in the laboratory, while attempts are being made to extend these techniques to the measurement of local wind speed at ranges of the order of 100-200 meters. Several methods have been considered, and all rely basically on illuminating a small volume of air with a powerful laser and detecting the Doppler shift in the frequency of the light scattered by the aerosol particles in that volume. This Doppler shift is proportional to one component of wind velocity, so to measure all components requires three suitably located detectors. Calculations show that the most promising methods require coherent detection of the scattered light, that is the wavefronts of the light scattered by all the particles in the illuminated region must be nearly parallel at the detector. The scattered intensity of laser light can be calculated by using Mie or Rayleigh scattering theory providing the particle density and size distribution is known. A serious problem in the atmospheric propagation of laser light is the effect of thermal gradients and their associated refractive index variations. A preliminary experiment which has been performed to measure the speed of an artificial wind containing smoke particles is described.

16013 APTIC NO. 33772

Ide, Yasuo

THEORY AND APPLICATION OF FACTORY SMOKE EMISSION DISPERSION PATTERN. *(Kojo haien no taiki kakusan riron to oyo). Text in Japanese. Japan Society of Civil Engineering, Tokyo, Proc. Summer Lectures Hydrog. Tokyo, Japan, 1971, 21p. 26 refs. (July.)*

Various theories of air dispersion patterns such as the transfer theory, the statistical theory, and equations and formulas of smoke concentration and distribution patterns such as the instantaneous, quasi-steady, and steady plumes are reviewed. Under a given wind direction and velocity on a flat land, the smoke rises by the emission velocity (Vg) against the wind to the (Hm) height. When the temperature of the smoke is high, it further rises by thermal buoyancy to the (Ht) height; (Hm plus Ht plus the height of the stack) is called the effective stack height. The smoke emitted at this height is dispersed by turbulence of the atmosphere and part of the diluted smoke reaches the ground. In reality, the rising and dispersion of the smoke occur simultaneously; but the ground concentration is presently calculated by the two-step plume-path-diffusion method. Various scientists calculations and their revisions are presented. These many formulas obtained purely on theory or on experiments are still affected by factors such as topography, air turbulence layers, a down-wash which occurs when the wind velocity is 50% faster than the emission speed, or down-draught which occurs when the stack height is less than 2.5 times more than nearby building or mountains. Individual studies must be made in such cases with the use of a wind tunnel simulation.

16014 APTIC NO. 34191

Itoo, K.

METEOROLOGY AND AIR POLLUTION, IN PARTICULAR THE SIGNIFICANCE OF INVERSION STRATA. *(Taiki osen to kisho, koto ni gyakutenso no igi). Text in Japanese. Naika, 21(5):820-822, May 1968.*

The relationship between meteorological factors and air pollution is investigated. With periods of atmospheric stability, an inversion stratum acts as a cover and retains the pollution underneath, causing heavy smogs. Inversions in Japan occur during the winter, in periods of rain fronts or migratory pressure, and with wind velocity of less than 3 m. Stacks high enough to break through the inversion strata would enable the emitted pollutant to dilute before reaching the environmental atmosphere. The height of the inversion strata, however, cannot be accurately measured and the pattern of diffusion in the unstable air above the strata is unknown. Weather and pollution forecasting demand accurate data. Present smog warnings are issued too late, do not enforce the elimination of pollutants, and affect only the use of low-sulfur content fuels.

16015 APTIC NO. 33935

Johnson, Warren B., F. L. Ludwig, and Albert E. Moon

DEVELOPMENT OF A PRACTICAL, MULTIPURPOSE URBAN DIFFUSION MODEL FOR CARBON MONOXIDE. *National Air Pollution Control Administration, Research Triangle Park, N. C., and North Carolina Consortium on Air Pollution, Proc. Symp. Multiple-Source Urban Diffusion Models, Chapel Hill, N. C., 1969, p. 5.1-5.38,14.4-14.5. 50 refs. (Oct. 27-30.) (APCO Pub. AP-86.)*

NTIS: PB 198400

Progress in the development of two essentially different types of diffusion models for carbon monoxide is reported: a synoptic model, which calculates hour-to-hour concentrations, for verification studies and possible operational use; and a climatological model, which calculates arithmetic mean concentrations and frequencies of extreme concentrations, for planning use. The design of these two models, as well as the results of limited evaluatin trials of an early version of the synoptic model, are described. The synoptic model design is based upon a modification of Clark s receptor-oriented model. In its present version it includes provision for handling extra-urban as well as intra-urban sources. In addition, a street sub-model is being developed. The climatological model is similar in basic form to the synoptic model but uses the joint frequency function for all combinations of specified classes of the input parameters, derived from a large body of hourly meteorological data. Implementation of the model required the development of an objective technique for converting traffic data to a time and space-dependent CO emission inventory, as well as methods for estimation of the meteorological variables appropriate to the urban area from routinely available (airport) weather data. Sample computed area-wide concentration patterns and time-varying point concentrations for St. Louis and Washington, D. C., are presented. (Author abstract modified)

16016 APTIC NO. 34080

Jones, H. G. and J. T. Davies

EXTERNAL DUST DEPOSITION AND SULPHUR EMISSION. *Iron Steel Inst., London, Spec. Rept., no. 61:16-23, 1958. 7 refs. (Presented at the Iron and Steel Institute, Air Pollution Meeting, London, England, Sept. 25-26, 1957.)*

External dust deposition and sulfur emission in steelworks and their environs were measured by gauges and the lead peroxide method, respectively, and correlated with wind strength and direction and height of discharge. The results were constructed into a survey grid to assess the gravity of the problem and the effects of ameliorative action. Grid surveys from various steelworks were reviewed. Contours for dust and sulfur trioxide distribution were devised.

16017 APTIC NO. 33975

Kelly, T.

THICK AND DENSE FOG AT LONDON/HEATHROW AIRPORT AND KINGSWAY/HOLBORN DURING THE TWO DECADES 1950-59 AND 1960-69. *Meteorol. Mag. (London), 100(1190):257-267, Sept. 1971. 2 refs.*

Occurrences of thick and dense fogs at London/Heathrow Airport and Kingsway/Holborn Weather Center were investigated for 1950-1969. Persistent fog lasted for 24 hours or more and semi-persistent fog lasted for 12 hours or more. Observations were continuous at Heathrow and every three hours at Kingsway/Holborn; visibility of less than 55 yards was defined as dense fog and at less than 220 yards as thick fog. Data on periods and duration of semi-persistent thick and dense fogs, average fog occurrence, and total hours of thick and dense fogs were tabulated monthly and annually and compared for decades. The forecasting problem and effects of smoke control are discussed. At Kingsway/Holborn, dense fog was unlikely at any time of year; thick fogs occurred most often between October and January and lasted for only one or two hours. Both thick and dense fogs occurred at Heathrow. Dense fogs were not likely during May-August; the dense-fog season was between October and January. The major thick-fog season was from September to March. The determined reduction in fogs was significantly correlated with smoke controls effected in the areas.

16018 APTIC NO. 33679

Khrgian, A. Ch.

CIRCULATION OF OZONE IN THE EARTH ATMOSPHERE. *(Zirkulation des Ozons in der Erdatmosphaere). Text in German. Umschau (Frankfurt), 71(20):751, Oct. 1971. 3 refs.*

Ozone, present in the atmosphere in small and varying concentrations, absorbs ultraviolet radiation from the sun and is responsible for the intense and constant heating of the stratosphere between 25 and 50 km. The highest ozone concentrations occur during the winter over the coldest regions of the earth (arctics, Siberia, Canada). During the summer, the ozone concentration decreases and the maximum is concentrated over the Pacific Ocean. The highest ozone concentration is between 20 and 30 km in the stratosphere. When ozone reaches the lower atmosphere due to turbulence, it decomposes near the surface, thus leaving the troposphere almost ozone-free. Geographic ozone distribution depends heavily on atmospheric circulation. Upward moving air masses in the stratosphere result in a lack of ozone.

16019 APTIC NO. 34133

Kleen, Roger H. and Norman L. Abshire

ATMOSPHERIC SCATTERING FROM A 1.15-MICRON LASER BEAM AND ITS OFF-AXIS DETECTABLE RANGE. *Environmental Science Services Administration, Boulder, Colo., Wave Propagation Lab., ESSA TR-ERL 90-WPL 5, 27p., Feb. 1968. 10 refs.*

The problem of determining the off-axis detectable range of a 1.15-micron laser beam is outlined and some pertinent examples are given of how this range is calculated. Fog and smoke angular scattering patterns determined experimentally are presented. The detectable range of a laser beam through a fog can be predicted fairly accurately for various detectors and collecting optical systems if temperature, relative humidity, and fog extinction coefficients are known. Some idea of the extinction coefficient in a particular fog can be gained from its visibility. If the transmission is less than 80% over the path in question, multiple scattering can become important. Smoke is much more variable and can not be characterized by its extinction coefficient alone. Particle size distribution and composition must be known. (Author summary modified)

16020 APTIC NO. 33579

Kobayashi, Masatoshi

ENVIRONMENTAL POLLUTION AND THE USE OF RI (RADIOACTIVE ISOTOPE). *(Kankyo osen to RI riyo no genjo). Text in Japanese. Genshiryoku Kogyo, 17(8):5-8, Aug. 1971. 6 refs.*

Tracer studies of gas dispersion patterns and chemical reactions using isotope ratios are discussed. Isotope ratios in sulfur are extremely different according to the conditions of accumulation and compaction of natural resources. Using this fact, a method of tracing dispersions of flue gases by identification of the S isotope ratio which is different from S in the air was developed. Sampling of sulfur dioxide is taken by a glass fiber preliminary filter and a cellulose filter with SO2 absorbent. The preliminary filter collects soot and SO3, and the second filter recovers SO2. After a chemical treatment, a quantitative analyzer measures the S isotope ratio; SF(6), emitted artificially from the flue with SO2, is measured by gas chromatography. Both data are compared, and the dispersion pattern and SO2 oxidation and reduction are determined. The method of tracing in a more difficult, complex environment is also given. Other radiation applied apparatus such as Sr (90) ozone counter and an Egg shell thickness gage are described. Application of radio-release and chemical substitution using kryptonate, developed by Schleck, and quantitative determinations of SO2 gas, fluoride, oxygen residue, chromium oxide ion, and vanadium hydroxide by various isotopes are briefly disscussed.

16021 APTIC NO. 33821

Kummler, R. H., M. H. Bortner, and L. S. Jaffe

CARBON MONOXIDE IN LOWER ATMOSPHERE REACTIONS. *Environ. Sci. Technol., 5(11):1140-1141, Nov. 1971. 14 refs.*

The rate constants and the upper limits for all known oxidizing agents preclude homogeneous gas-phase reaction on a scale necessary to explain atmospheric carbon monoxide loss. Moreover, it is highly unlikely that an unknown species would remain at constant concentration from experiment to experiment and throughout any given experiment thereby permitting an apparent first-order reaction to be observed. It is more consistent with first-order kinetics to assumes that the reaction partner is adsorbed on the walls of the reaction vessel where a heterogeneous catalytic reaction occurs. In any case, it is highly unlikely that homogeneous gas-phase kinetics at ground level can explain the CO sink anomaly. It is more probable that a biological sink is required to convert CO to carbon dioxide, such as the fungi previously suggested.

16022 APTIC NO. 33658

Lamb, Dennis

AN IMPLICATION OF A MODEL OF AMMONIA-SULFUR DIOXIDE REACTIONS TO THE ATMOSPHERE. *J. Atmospheric Sci., 28(6):1082-1083, Sept. 1971. 7 refs.*

A laboratory study of gas phase reactions between ammonia and sulfur dioxide suggested that the resulting solid products may be stable under conditions that prevail in the lower stratosphere and, thereby, that such reactions may be of importance to the formation of the stratospheric aerosol layer. The stability of the products was determined by measuring their equilibrium vapor pressures. These pressures were found to be dependent on the composition of the products and to form a family of curves when plotted against temperature. To explain this result, a thermodynamic model was developed which fits the vapor pressure data and gives further insight into the nature of the chemical interactions. Assumptions and implications of this model are discussed.

16023 APTIC NO. 33873

Langer, Gerhard

PHOTOCHEMICAL GENERATION OF LEAD OXIDE ICE NUCLEI FROM AUTOMOBILE EXHAUST. *International Union of Geodesy and Geophysics, International Commission of Cloud Physics, Intern. Conf. Condensation Ice Nuclei, 7th, Prague, Czechoslovakia - Vienna, Austria, 1969, p. 215-219. 13 refs. (Sept. 18-24.)*

Measurement of ice nuclei under varying conditions in the Denver-Boulder atmosphere are described which indicate that lead oxide, rather than lead iodide, is the active nucleating agent. Atmospheric ice nuclei were counted with the National Center for Atmospheric Research Ice Nucleus Counter, the Bigg-Warner expansion chamber, and the membrane technique; condensation nuclei were measured with NCAR Condensation Nucleus Counter. Measurements were taken at an elevation of 5400 ft, 6150 ft, and in the high mountain valley of Fraser, 50 mi west of Boulder. Counts were also made with airborne instruments. High counts correlated with light southerly winds, warm dry days, and a yellow-brown haze bank extending from Denver toward Boulder along the front range of the mountains. Active particles formed only in the upper part of haze or smog layer, explaining the lack of counts of lower elevations in Boulder. A heavy haze layer with a sharp dark brownish edge was indicative of high counts. On a number of occasions high counts were encountered with no iodine present to activate lead particles in the air. Free lead may react in some manner to form lead oxide, possibly with the aid of nitrogen oxides.

16024 APTIC NO. 33335

Lilly, D. K.

ON THE NUMERICAL SIMULATION OF BUOYANT CONVECTION. *Tellus (Uppsala), vol. 14:148-172, 1962. 33 refs.*

The two-dimensional turbulent vortex generated by release of buoyant fluid from an instantaneous thermal line source was simulated by machine numerical solution of a complete set of Eulerian gas equations. The equations included turbulent eddy exchange terms, similar to those used by Smagorinsky, which made possible the generation of computationally stable solutions qualitatively and quantitatively resembling the convective thermals studied and described by Scorer and Richards. The results of a number of numberical experiments, performed with varying computational approximations, lead to conclusions as to the importance of various sources of numerical errors and the validity of the eddy exchanged formulation. The formulation leads to qualitatively good results with the resolution provided by about 1500 grid points, but it has not yet been possible to exhibit the shape-preserving stage assumed in theoretical treatments and found approximately by laboratory experiments. This is probably due in large part to the neglect of the effects of eddies in the third dimension. (Author abstract)

16025 APTIC NO. 33431

Manier, G.

ERRORS IN THE MATHEMATICAL DETERMINATION OF THE DISTRIBUTION OF ATMOSPHERIC TRACE SUBSTANCES. *(Die Fehler bei der rechnerischen Erfassung der Ausbreitung atmosphaerischer Spurenstoffe). Text in German. Hessisches Ministerium fuer Wirtschaft und Verkehr West Germany, Proj. 31/66, Rept. 6, 22p., Jan. 1969. 7 refs.*

NTIS: N70-23670

Two-thousand-ninety-one ground level concentration measurements of sulfur dioxide levels recorded around a sulfuric acid plant at Frankfurt-Hoechst were compared with respective concentrations determined mathematically by using a formula derived for this purpose in order to arrive at the degree of reliability of values obtained by calculation. In view of the circumstance that the mathematical determination of trace gas concentrations is predicated on a number of assumptions, no agreement between calculated and measured values can be expected. No conclusions about concentration distribution of a pollutant emitted from a single source can be drawn from ground level concentration measurements. A comparison of measured with calculated concentrations presupposes the exact knowledge of meteorological parameters and of other data pertaining to all emission sources under scrutiny. Even so, individual measurements will be at variance with their respective calculated values by no less than a factor of two.

16026 APTIC NO. 34088

McAllister, Jack Donald

A MOMENTUM THEORY FOR THE EFFECTS OF CROSS FLOW ON INCOMPRESSIBLE TURBULENT JETS. *Tennessee Univ., Knoxville, Dept. of Mechanical and Aerospace Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1968, 132p. 25 refs.*

The major effects produced by the addition of cross flow to a turbulent jet were investigated. This flow arrangement has direct application to several practical problems: flow of smoke from a chimney into a moving atmosphere in connection with control of smog; the process of injecting cooling air into certain gas turbine engines; and flow fields produced by vertical take-off and landing aircraft. Methods included visual flow observation, analytical study, and additional analysis of previously published measurements. Jet trajectories were observed over a range of jet to free stream velocity ratios for three jet entry angles and two different conditions for the surface surrounding the jet exit. A strong vortex street exists in the near jet wake and to produce marked flow fluctuations in this region. Analysis of published measurements yielded a momentum entrainment principle that relates the fluxes of mass and momentum within the jet to the more easily measured local trajectory angle. The jet external flow interaction is predominately a mixing phenomenon that may be evaluated by a control volume analysis. This analysis provides both numerical and approximate analytical solutions for the jet trajectory. These solutions were correlated with measured trajectories in terms of a function depending only on a statistically defined velocity ratio. A brief analysis of buoyancy effects was accomplished to establish the conditions for these forces to significantly alter the jet trajectory. (Author abstract modified)

16027 APTIC NO. 34102

Megaw, W. J. and L. C. Cox

A COMPARISON OF THE UPTAKE OF SULPHUR DIOXIDE IN GROWING AND EXISTING DROPLETS. *International Union of Geodesy and Geophysics, International Commission on Cloud Physics, Intern. Conf. Condensation Ice Nuclei, 7th, Prague, Czechoslovakia-Vienna, Austria, 1969, p. 92-95. 4 refs. (Sept. 18-24.)*

Following a report that industrial mists of ammonium sulfate had been observed to form about 100 downwind of a pair of stacks emitting, respectively, sulfur dioxide and ammonia, experiments were undertaken to determine whether there was a difference in the uptake of SO2 in growing and existing droplets, both in the presence and absence of ammonia. Droplets were grown in diffusion cloud chambers in which supersaturations of up to 1% could be obtained by maintaining temperature differences of up to 5 C between the two wetted plates. In one experiment, the air carrying a known concentration SO2 was passed through a cloud chamber in which water droplets were growing on sodium chloride nuclei; in a second experiment, the droplets were first grown in an SO2-free atmosphere and then passed, together with the known concentration of SO2, through an identical cloud chamber which had no temperature difference between its plates. Test experiments showed that no appreciable further growth occurred in this chamber. Both gas streams were then passed through a liquid impinger and through a bubbler containing one volume of hydrogen peroxide solution to remove the gaseous SO2. Sulfur-35 contents of both the impingers and the bubblers were then assessed by liquid scintillation counting. The percentage of SO2 concentration taken up by the droplets falls off very rapidly with increasing SO2 concentration.

16028 APTIC NO. 34127

Montgomery, T. L., S. B. Carpenter, and H. E. Lindley

THE RELATIONSHIP BETWEEN PEAK AND MEAN SO2 CONCENTRATIONS. *American Meteorological Society, Boston, Mass., Am. Meteorol. Soc., Conf. Air Pollut. Meteorol., Raleigh, N. C., 1971, p. 136-142. 3 refs. (April 5-8.)*

The results of studies on the relationship between peak and mean sulfur dioxide concentrations, applicable to point source dispersion problems, are presented. Continuous monitors measured SO2 concentrations in the vicinity of a coal-fired power plant, and the determinations were correlated with meteorological data (temperature gradients, atmospheric stability, turbulence, neutral conditions, and winds). The basic parameters were processed by computer. The peak-mean ratios decreased with increasing distance ranging from 3-17 km from the stacks. Peak-one hour ratios decreased with increasing atmospheric stability.

16029 APTIC NO. 33675

Moriguchi, Minoru

THE PROPER UTILIZATION OF THE SCIENCE RELATING ATMOSPHERIC DISPERSION. *(Taiki osen taisaku to taiki kakusan no kagaku) Text in Japanese. Kogai To Taisaku (J. Pollution Control), 7(10):16-20, 1971. 8 refs.*

Effective stack height standards in Japan are based on Bosanquet s smoke rise calculation. However, this method is often applied without considering geographical and other environmental conditions. The legal effective stack height does not take downwash or downdraft into consideration. Results of tracer emission experiments conducted at the shoreline of the Ako area showed complex and unexpected patterns due to topography. Difference in average temperatures in winter between a center city location and suburbs was observed by comparing measurements in the center of Tokyo and Kawaguchi city. The temperature in the city was higher than the suburb in the morning and afternoon, but while the difference decreased gradually from the ground surface up to 253 m in the morning, the atmospheric layers were clearly divided into two groups in the afternoon. The layer above 180 m showed little geographical difference, but the temperature in city in the lower layer was extremely high and showed a trapping-type stable upper layer and an extremely unstable lower layer. The heat inland effect influences pollution greatly. Previous knowledge concerning dispersion patterns used for control methods put too much emphasis on the highest concentration on the land surface and neglected considerations for dispersion patterns and duration of pollution.

16030 APTIC NO. 33976

Morton, B. R.

THE CHOICE OF CONSERVATION EQUATIONS FOR PLUME MODELS. *J. Geophys. Res., 76(30):7409-7416, Oct. 20, 1971. 10 refs.*

Theories on the behavior of turbulent buoyant plumes generally form three classes: strictly self-similar models valid only in a uniform environment; quasi-similar models on conservation of momentum, heat, and kinetic energy of mean motion; and quasi-similar models based on flux conservation of mass, momentum, and heat. The quasi-similarity approaches are compared; the relationship between the field and gross-flux forms of the equations of motion is considered. The two approaches yielded approximate results in the main region of flow, but marked differences developed in the upper region. Models based on conservation of mass, momentum, and heat showed increased rates of spread with large upper radius; models based on conservation of momentum, kinetic energy, and heat showed large negative buoyancies and reversed entrainment with loss of plume fluid across the boundary from turbulent to quiescent flow regions. (Author conclusions modified)

16031 APTIC NO. 33569

Moses, Harry, D. F. Gatz, J. E. Carson, F. G. Kulhanek, and G. A. Zerbe

THE ANATOMY OF AN AIR POLLUTION EPISODE. *In: Radiological Physics Division Annual Report. Environmental Studies. Argonne National Lab., Ill., Radiological Physics Div., p. 165-191, 1970.*

NTIS: ANL-7760, Part III

High concentrations of pollutants accumulated in lower atmospheric layers over Chicago during the first and second weeks of November 1969. Time series plots are given on the meteorological conditions which led to poor dispersion. They indicate the presence of a stagnating flat-gradient, high pressure system with the usual poor inversion lid and light winds. Maps giving isopleths of sulfur dioxide concentrations and wind data are presented for November 4 and 5, 1969. The maps illustrate the patchiness of the SO2 distribution over the city. While one station recorded a peak concentration of 0.75 ppm, another showed only 0.06 ppm. High SO2 levels were associated with southwesterly winds, and reduced levels with easterly winds. While average hourly and 24-hour values during the episode frequently exceeded Illinois air pollution standards, the highest 24-hour SO2 value was exceeded seven times in November 1966, 1967, and 1968. Leaf burning was responsible for poor local visibility on a number of days during the 1969 episode.

16032 APTIC NO. 33571

Moses, Harry, Donald F. Gatz, Arthur C. Strong, and Gunther A. Zerbe

MIXING HEIGHTS, VENTILATION RATES AND OBSERVED GROUND SO2 CONCENTRATIONS. *In: Radiological Physics Division Annual Report. Environmental Studies. Argonne National Lab., Ill., Radiological Physics Div., p. 84-108, 1970. 5 refs.*

NTIS: ANL-7660, Part III

A program of low-level atmospheric soundings from Chicago Midway Airport began in April 1969 to determine urban mixing heights and ventilation rates and their relationship to ground level sulfur dioxide concentration rates and their relationship to ground level sulfur dioxide concentrations at eight stations. Analysis of the data show a weak relationship between SO2 concentrations, mixing height, and ventilation rate. No direct relationship was apparent between three hour mean SO2 concentrations, averaged over all stations, and the mean three C morning mixing height or afternoon mixing height. The highest concentrations occurred with relatively low mixing heights, and the highest mixing heights were accompanied by low concentrations. When 24 hr changes in mixing height and the ventilation factor were compared against changes in three hour average SO2 concentrations, a better relationship was found between morning mixing heights and SO2 than afternoon mixing heights; and afternoon ventilation rates were somewhat better related to SO2 than mixing heights. The mean morning mixing height was larger in winter than in summer, but the opposite was true of afternoon maximum mixing height and afternoon ventilation rate. Both mixing heights and ventilation rates varied markedly with wind direction. In the heating season, large values of mixing heights and ventilation rates were associated with northwesterly winds. In the warm season, large mixing heights were uniformly distributed with direction in the morning; in the afternoon southwesterly and westerly winds were prevalent. There was a striking maximum in summer ventilation rates with southwesterly winds.

16033 APTIC NO. 33865

Olsson, L. E., W. L. Tuft, W. P. Elliott, and M. P. McCormick

OBSERVATIONAL STUDY OF THE HAZE (MIXING) LAYER IN WESTERN OREGON USING LASER RADAR, INSTRUMENTED AIRCRAFT, AND METEOROLOGICAL BALLOONS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 13p., 1971. 7 refs. (Presented at the Air Pollution Control Association Annual Meeting, 64th, Atlantic City, N. J., June 27-July 2, 1971, Paper 71-96.)*

Intensive observational studies of the natural ventilation in the Columbia-Willamette valley region of Oregon were conducted during the summer of 1970. During a seven day intensive study period, laser radar measurements of the top of the haze layers were coordinated with radiosonde, aircraft, and pilot balloon measurements. Temperature and aerosol concentration profiles were obtained by means of an instrumented aircraft. A ground based laser radar system capable of emitting an energy of one to two joules in a 20 nsec. pulse were used. The system probed the atmosphere at zenith, with maximum energy emitted at 0.3472 and 0.6943 micron. The actual mixing height, as indicated by the top of the haze layer and a strong reduction in aerosol concentrations, was closely correlated with stable layers aloft. Laser radar not only provides a valuable tool for the measurement of temporal and spacial variations of the actual mixing height, but it also lends itself to detailed studies of the distribution of aerosols within the mixing layer. (Author abstract modified)

16034 APTIC NO. 33692

Overcamp, Thomas J. and David P. Hoult

PRECIPITATION IN THE WAKE OF COOLING TOWERS. *Atmos. Environ., 5(9):751-765, 1971. 19 refs.*

A model is proposed for determining the conditions under which precipitation can occur from a natural draft cooling tower. Because the time scale for forming rain drops is large compared to the average residence time of droplets in the plume, there is no precipitation unless the wind forces the plume to mix with the aerodynamic wake of the tower and brings it to the ground. When this occurs, the small fog droplets in the plume will diffuse to the ground, causing a light precipitation. A simple theory gives the heat transfer and the flux of water vapor emitted by the cooling tower. Equilibrium thermodynamics of mixing processes are used to calculate how much water vapor condenses as the plume is diluted with the surrounding air. Scaled experiments in a towing tank defined, in dimensionless variables, the conditions under which the plume will interact with the wake and strike the ground. A turbulent diffusion model combined with the thermodynamics of mixing is used to estimate the precipitation. These calculations showed that precipitation can be a tenth of a cm/hr when the temperature is as cold as -10 C. They also show that precipitation depends strongly on the relative humidity at warmer temperatures. (Author abstract)

16035 APTIC NO. 33729

Randhawa, Jagir S.

OZONE MEASUREMENTS NEAR SUNRISE. *Nature Phys. Sci., 233(40):101-102, Oct. 4, 1971. 5 refs.*

A rocket-borne ozonesonde was modified to include a constant-volume sampling pump and, together with temperature, density, and pressure sensors, was launched on an 85,000 cu m balloon, which reached an altitude of 46 km at the time of sunrise. A Mast electrochemical ozonesonde was also released and reached an altitude of 33 km. The objective of the tests was to obtain information about ozone concentration in the overlap region by two different instruments. The ozone concentration was constant when the balloon was floating between 45 and 46 km altitude before sunrise and started decreasing approximately one min before the rays of the sun were actually incident on it, indicating that scattered radiation had no effect during the pre-dawn hours. The change in ozone concentration was nearly instantaneous and decreased to almost one-third. The large decrease was the result of the increased rate of water vapor desorption from the balloon at sunrise.

16036 APTIC NO. 33978

Ripperton, Lyman A. and Fred M. Vukovich

GAS PHASE DESTRUCTION OF TROPOSPHERIC OZONE. *J. Geophys. Res., 76(30):7328-7333, Oct. 20, 1971. 5 refs.*

Gas phase reactions were examined as a possible sink for tropospheric ozone. Ozone, nitric oxide, and nitrogen dioxide concentrations were measured, and wind speed, wind direction, and temperature were determined to calculate the magnitude of transport of O3. Various meteorological variables (inversions, lapse rates, turbulence, boundary layers, and advection) were monitored. An equation for continuity was computed and the magnitude of the destructive term was determined. The data was consistent with the hypothesis that the reaction between O3 and NO2 acted as a significant sink for both compounds.

16037 APTIC NO. 33914

Robinson, Elmer, Harriett Currie, and Howard A. James

ASPECTS OF SAN FRANCISCO VISIBILITY CLIMATOLOGY. *Preprint, American Meteorological Society, Boston, Mass., 15p., 1960. 4 refs. (Presented at the American Meteorological Society, Natl. Meet., 187th, Eugene, Oreg., June 14-16, 1960.)*

The observed visibility in a community reflects not only weather patterns but also the air pollution emissions from sources in the surrounding area. One of the longest local visibility records is that of the San Francisco City Office of the

U. S. Weather Bureau. It covers the period from 1933 through 1956 for week-day noon observations. The visibility limits were 2.5, 6, 12, and 30 miles. The lowest range, 0-2.5 miles, was exceeded more than 90% of the time and showed little tendency to change from year to year. In the range from 0-6 miles, there was more variability from year to year; no long-term trend is apparent. For visibilities over 12 miles, the annual frequency changed from a high of 67% in 1937 to a low of 21% in 1955. While there is variation from year to year, a downward trend seems indicated. Visibilities in the range over 30 miles also seem less frequent in the 1940s and 1950s. Visibility is not an independent variable but reflects the effects of relative humidity and wind. At high humidity, fog and hygroscopic materials lower visibility; wind direction and wind speed affect the travel and dilution of pollutants. Visibility observations were made when the relative humidity was low and the wind speed less than 10 mph, but no long-term trend was detected. Easterly winds decreased visibility, indicating that they carry an increased pollution load.

16038 APTIC NO. 34158

Robinson, N.

THE ASTRONOMICAL AND GEOGRAPHICAL FACTORS AFFECTING THE AMOUNT OF SOLAR RADIATION REACHING THE EARTH. *In: Solar Radiation. N. Robinson (ed.), New York, Elsevier Publishing Co., 1966, Chapt. 2, p. 29-46. 5 refs.*

The earth describes an ellipse around the sun, with the sun at one of the foci. The mean distance of the earth from the sun is defined as half the sum of perihelion and aphelion distances. The radius vector of the sun, its apparent radius, and the intensity of solar radiation at the surface of the earth depend on the earth s position in orbit. The position of the sun on the celestial sphere can be specified by a number of coordinate systems. The horizontal and equatorial systems are explained. Equations are given to determine the quantity of energy insolated on any given plane at the surface of the earth. The solar day, the period between successive passages of the sun through a given meridian, is not constant, due to the eccentricity of the earth s orbit and the fact that the ecliptic is inclined to the celestial equator. Both of these factors also influence the amount of solar radiation that reaches the earth.

16039 APTIC NO. 33927

Rondia, D.

CLIMATIC FACTORS AND AIR POLLUTION IN URBAN CENTERS. *(Facteurs climatiques et pollution de l air en milieu urbain). Text in French. World Met. Org. Tech. Note (Geneva), 108:238-247, 1970. 3 refs.*

The direct and indirect influence of various climatic factors on emissions are discussed on the basis of air quality measurements made in biege, Belgium, and its suburbs in 1958-1959. The average differences between the hot and cold seasons provide an objective assessment of the amount of pollution from industrial and urban causes. For certain pollutants, such as carcinogenic polycyclic hydrocarbons, the differences are highly pronounced. The daily concentrations of the pollutants and their correlation with climatic conditions indicate the basic importance of meteorologic and topographic factors in dispersion. These facts indicate important approaches to abatement planning, and particularly to the development of forecasting and emergency systems. Certain forms of pollution are directly associated with population density. The wide dispersion area of industrial effluents is defined and the role of green spaces in the Liege area is assessed on a quantative basis.

16040 APTIC NO. 34021

Rozenberg G. V. and A. B. Sandomirsky

THE OPTICAL STRATIFICATION OF ATMOSPHERIC AEROSOL. *(Opticheskaya stratificatsiya atmosfernogo aerozolya). Text in Russian. Izv. Akad. Nauk SSSR, Fiz. Atmosfery i Okeana, 7(7):737-749, 1971. 71 refs. (Presented at the 13th KOSPAR Meeting in Leningrad, May 1970.)*

Results are discussed of an optical probing of the atmosphere carried out for the computation of an air scattering coefficient, related to altitude. The altitude trend of atmospheric turbulence reveals a basic feature in the stratification of atmospheric aerosol. This stratification consists of three specific levels of turbulence; these levels are separated by stable regions of air purification which are located around seven and 33 km altitudes. Both these layers are characterized by an increase of scattered light polarization. The turbidity of the ground level air is determined by two factors, the relative concentrations of finely dispersed condensation nuclei (not subject to washout) and the relative atmospheric humidity. An increase of the particle size of finely dispersed mist constituents occurs under conditions of increased relative humidity (above 70%) leading to the formation of coarse particle haze. These haze phenomena occur mainly in regions of temperature inversions. The particles generated within the glow region carry a certain role in the ground level atmosphere up to four or five kilometer levels. Reference is made to the contribution of ozone in the generation of suspended particles. The discussed data are useful for the elaboration of an aerosol model of the atmosphere.

16041 APTIC NO. 33333

Schmidt, F. H.

ON THE DIFFUSION OF HEATED JETS. *Tellus (Uppsala), vol. 9:378-383, 1957. 8 refs.*

A general expression is derived for the propagation of a heated jet in a stagnant environment. It is shown that the solution of W. Schmidt and Tollmien are contained in the general one. Tollmein had restricted himself to the case of an incompressible fluid of the same density as the environment, while Schmidt extended Tollmien s theory to the case of a heated jet rising due to buoyancy. However, it is possible to arrive at a general solution without introducing any special assumptions about the velocity and temperature distributions in the jet. A new cross-sectional velocity distribution is proposed which seems to be preferable to the general accepted Gaussian distribution. (Author abstract modified).

16042 APTIC NO. 33486

Semenova, L. G. and I. I Solomatina

SOME RESULTS OF MICROCLIMATIC SURVEYS UNDER CONDITIONS OF RUGGED RELIEF. *Tr. Gl. Geofiz. Observ. (Leningrad), no. 138:38-41, 1963. 4 refs. Translated from Russian in: Soviet Investigations of Atmospheric Pollution, p. 46-50, Nov. 9, 1964. Joint Publications Research Service, Washington, D. C.*

NTIS: JPRS 27-279

Microclimatic surveys of the terrain conducted for the purpose of studying the dissemination of admixtures under conditions of rugged relief were examined. The surveys were conducted to find a link between the temperature and the wind under the different conditions prevalent at the point of observation and the data obtained by a meteorological station situated on the flat summit of a hill. Observations of the temperature, humidity, and wind were conducted in series during the course of one hour simultaneously with observations at the main station. An analysis of the material yielded by the microsurveys indicated that there is a decrease in the ratio of wind velocities from 0.9 to 0.6 with a lowering of the relief. The ratio between wind velocities depends on how low the terrain is and the position of the point with respect to the direction of the predominant airflow. The temperature did not differ from the observation points and the station.

16043 APTIC NO. 33379

Senshu, Toshio

RELATION BETWEEN NOCTURNAL RADIATION AND CLOUD FOR THE ESTIMATION OF PASQUILL S STABILITY. *(Taiki hosha to yaken no unkei, unryo no kankei narabi ni kore o michiita Pasquill anteido no suitei ni tsuite). Text in Japanese. Denryoko Chuo Kenkyusho Gijutsu Kenkyusho Hokoku (Tech. Lab. Central Res. Inst. Electric Power Ind., Rept.), no. 70069:1-13, Dec. 1970. 3 refs.*

Atmospheric stability near the ground can be estimated by the insolation, wind velocity, and cloudiness at night from the use of the table proposed by Pasquill. Since cloudiness usually has been measured by the naked eye, it was thought necessary to improve the method of measurement. Nocturnal radiation, which is one of the meteorological elements related to night cloudiness, was investigated. A new table is proposed which makes use of a relation between the nocturnal radiation under a clear sky and the type of cloud. All the quantities to define stability have been determined automatically. (Author abstract modified)

16044 APTIC NO. 33680

Senshu, Toshio

ON THE CALCULATION FORMULA OF LARGE SCALE DIFFUSION FROM HIGH LEVEL SOURCE. *(Taiki kakusan shiki no seiri to kaisetsu). Text in Japanese. Kogai To Taisaku (J. Pollution Control), 7(10):27-32, 1971. 4 refs.*

Pollution may be reduced by reduction of emission rate, taller stacks, greater wind velocity, a smaller vertical diffusion index, and a larger horizontal diffusion index. Several diffusion formulas are given which differ by the method of obtaining a dispersion index and the form of the function according to aerial variations. However, when arbitrary diffusion index figures are used, the maximum concentration distance and maximum concentration values coincide remarkably. The suitability of various formulas must be determined by comparing axial, horizontal, or vertical concentration patterns with actual field investigations. The horizontal dispersion width of smoke is generally proportional to the standard deflection index of wind direction, and based on one-hour observation, dispersion angle divided by standard deflection of wind direction is approximately 0.5. When the air was unstable the actual measurement of the dispersion angle was extremely small compared to Pasquill s method of the angle.

16045 APTIC NO. 33516

Shifrin, K. S. and V. I. Golikov

A METHOD AND DEVICE FOR DETERMINING THE MICROSTRUCTURE OF CLOUDS AND FOGS. *Hydrometeorological Service of the USSR, Tr. Vses. Nauch. Meteorol. Soveshuh., 1962, vol. 9. 8 refs. Translated from Russian in: Instruments and Methods for Meteorological Observations, p. 294-301, 1966, by A. Wald, Israel Program for Scientific Translations, Jerusalem.*

NTIS: TT 65-50004

The development of an optical method for determining the microstructure of fogs and large-drop clouds and for testing results are reported. The method and device are based on an analysis of data on the properties of a polydisperse system of cloud and fog droplets appearing in sections of the indicatrix of dispersion corresponding to small dispersion angles. Usually, scattering under small angles, which forms the coronas, is employed for determining the average radius of drops in clouds and fogs. This is done by measuring the angular diameters of diffraction rings viewed in the direction of the light source. In a polydisperse system, individual coronas corresponding to different drop size are not noticed, and the pattern of distribution of light scattered by droplets becomes blurred. The portable diffraction fog-structure meter consists of a light source, condensor lens, with an optical attentuator and monochromatic light filter, collimator, test chamber, and device for sampling and suction of aerosol, light receiver with scanning device and setup for recording the angular distribution of scattered light, power pack, and control console.

16046 APTIC NO. 33482

Shreve, W. B. and L. W. Wachtel

EFFECT OF EXTRANEOUS PARTICULATE MATTER ON AIRBORNE BACTERIA. *J. Dent. Res., vol. 49:589-592, May-June 1970. 9 refs.*

Factors that alter concentrations of airborne microorganisms were studied by aerosolizing Bacillus subtilis spores into a dust-free and bacteria-free room. After persistence of the spores in a dust-free environment was determined under existing conditions of temperature and humidity, two series of tests were conducted in which varying amounts of particulate matter were dispensed in a convergent stream with the aerosolized spores. In one series, 1.00, 3.0, 5.0, 10.0, or 15.0 g calcium phosphate powder were blown into the room from a 250-ml flat-bottom flask. In the other series, hairspray was aerosolized directly from its container to disseminate 0.3 or 1.0 g solid constituents at the rate of 0.01 g/sec. Air sampling showed that the fallout rate of 32%/hr for spores alone increased two-fold with the addition of calcium phosphate powder and 1.6-fold with hairspray solids. There appeared to be a point at which saturation occurred and further additions of particulate matter did not increase the effect.

16047 APTIC NO. 34055

Starr, Victor P. and Jose P. Peixoto

POLE-TO-POLE EDDY TRANSPORT OF WATER VAPOR IN THE ATMOSPHERE DURING THE IGY. *Arch. Meteorol. Geophys. Bioklimatol. Ser. A (Vienna), 20(2):85-114, 1971. 17 refs.*

An attempt was made to study and to estimate the various modes of horizontal water vapor transfer in the entire atmosphere on a planetary scale from International Geophysical Year (1958) data. The relative importance of the estimates of the various transfer modes for the total transport was analyzed in relation to the main features of the general circulation. Maps for the vertically integrated fields of the mean zonal and mean meridional eddy transports covering the globe from pole to pole are presented and their structure and implications discussed. To complete the description of the various transfer processes, the vertical distribution of the estimated contributions by the transient and standing eddies, and by the mean circulations as well as the corresponding vertically integrated values are given in tubular form and in cross sections or meridional profiles. The main characteristics of the mean divergence fields of each one of three main modes of water vapor transfer are analyzed and the corresponding contributions for the total zonal water balance for the globe are discussed. The estimated values of the various fields appear to give consistent results and mainly agree with previous findings. (Author summary modified)

16048 APTIC NO. 33945

Viezee, William and John Oblanas

LIDAR-RADAR LOWER ATMOSPHERIC OBSERVATIONS. *Stanford Research Inst., Menlo Park, Calif., Air Force Contract F 19628-68-C-0021, Proj. 6670, Task 667002 Work Unit 66700201, Rept. AFCRL-68-0586, SRI Rept. 6903, DOD Element 62405394, DOD Subelement 681000, 76p., Nov. 15, 1968. 8 refs.*

NTIS, DDC: AD 679594

Daytime observations of the vertical temperature and humidity structure in the atmosphere below 1000 meters made with a Cricketsonde rocket system were compared with simultanseous observations from a ruby lidar and a microwave Ka-band radar. Observations were made in Palo Alto, California, during August, 1968 in the absence of low clouds when haze and pollution were visually evident. Analysis of the data show a direct relationship between Cricketsonde and lidar data, an indirect relationship between Cricketsonde and Ka-band data, and no relationship between lidar data and Ka-band data. Invariably, the temperature profile obtained by the Cricketsonde includes a subsidence inversion during early morning. Either this inversion persists throughout the day or it is destroyed by surface heating, and the temperature lapse approaches the dry adiabetic by mid-afternoon. The lidar observed a deep layer of particulate matter, its upper boundary rising in height from morning to afternoon. The presence of this layer in the lidar data is not dependent on the vertical temperature or humidity structure. During periods of extensive vertical stability, the temperature profile imprints a structure of variable optical density on the aerosol layer. When a subsidence inversion is observed, the largest change in optical density is detected at the level of the temperature inversion. However, concentrations of particulate matter are observed by the lidar at levels above that of the inversion. By monitoring the time change in intensity and in internal stratification of the permanent aerosol layer, the lidar can follow the life cycle of the subsidence inversion. The only echoes recorded with the microwave Ka-band radar are classified as angles having typical random point or discrete structure. (Author abstract modified)

16049 APTIC NO. 33519

Volz, Friedrich

THE SPECTRAL MEASUREMENTS OF SUN-RADIATION AND ESTIMATION OF TURBIDITY WITH A SMALL SELENIUM PHOTOELECTRIC CELL. *(Spektrale Messungen der Sonnenstrahlung und Truebungsbestimmung mit Selenzellen-Kleinphotometern). Ber. Deut. Wetterdienstes (Frankfurt), no. 54:280-284, 1958. 5 refs. Translated from German by L. Darby. 5p.*

A photometer was developed for the measurement of the red and blue radiation of the sun. The photocurrent is measured by a selenium photoelectric cell and a technical microammeter. Filters and the selected photoelectric cell have very low temperature coefficients. Because of the short duration of the measurements, the photocurrent shows no fatigue. A special device on the sun photometer allows the direct reading of the optical air mass. A series of measurements from the Alps and the North Atlantic Ocean demonstrated the reliability of the sun photometer with very clear air. It is expected that the use of such instruments at different locations in connection with observations of haze turbidity may give extended insight into meteorological, synoptic, physical, and industrial problems of the aerosol. (Author abstract modified)

16050 APTIC NO. 34054

Werner, Julius

AN ATTEMPT AT NUMERICAL DETERMINATION OF THE VERTICAL AUSTAUSCH COEFFICIENT OF WATER VAPOUR IN THE BOUNDARY LAYER NEAREST THE WATER SURFACE. *(Ein Versuch zur numerischen Bestimmung des vertikalen Austauschkoeffizienten fuer Wasserdampf in der wassernaechsten Luftschicht). Text in German. Arch. Meteorol. Geophys. Bioklimatol. Ser. A (Vienna), 20(2):159-174, 1971. 28 refs.*

The evaporation of the free water surface on the Steiner See near Muenster (West Germany) was recoreded in 1967/68 using immersed measuring pans. A floating buoy simultaneoulsy permitted establishment of the vertical profiles of wind speed, air temperature, and humidity to a height of 3.3 m. In order to prove whether the evaporation of inland water bodies can be determined by gradient measurements of the vertical flux of water vapor, two different methods were used to test the possibilities of a numerical determination of the Austausch coefficient of water vapor in adiabatic air near the water surface. The first method makes use of the comparison of the Austausch coefficients of latent heat and impulse flux for the case of neutral air stratification; the second method uses the evaporation measured directly from the pans in addition to the vertical water vapor pressure profile for the determination of the Austausch coefficient of water vapor. Neither method leads to satisfactory results, and conclusions are drawn about the usefulness of vertical gradient measuring methods for determination of evaporation in inland waters. (Author summary modified)

16051 APTIC NO. 33693

Wessels, H. R. A. and J. A. Wisse

A METHOD FOR CALCULATING THE SIZE OF COOLING TOWER PLUMES. *Atmos. Environ., 5(9):743-750, 1971. 8 refs.*

The emission from a wet cooling tower consists of saturated and heated air. The plume of the tower is described in terms of the dispersion of the enthalpy gained by the air in the tower. A nomogram is developed to determine the length of the visible part of the plume. The conditions for which the plume reaches the ground are given in dependence of the Pasquill-stability class and the effective source height. This theoretical model is demonstrated for a fictitious 500 MW natural draft cooling tower using meteorological data of one winter season at De Bilt, Netherlands. (Author abstract)

16052 APTIC NO. 34188

Winchester, John W.

OCCURRENCE OF HALOGENS IN ATMOSPHERIC AEROSOLS AND PRECIPITATION. *Michigan Univ., Ann Arbor, Dept. of Meteorology and Oceanography. Atomic Energy Commission Contract AT(11-1)-1705, Project ORA 08903, Rept. C00-1705-1, 15p., March 1968. 10 refs.*

The feasibility of using halogens in rain water as a natural atmospheric tracer for sea salt was tested by neutron activation analysis. Samples of rain water from hurricane Faith, collected by aircraft over a 500 km diameter on September 1, 1966, were analyzed for chlorine, bromine, and iodine in 1-ml volume. Unlike rains over Hawaii but similar to aerosols collected over the open Pacific, hurricane Br/Cl is frequently much less than the sea water ratio Br/Cl equal to 0.0034 and may be accounted for by oxidation and volatility loss of bromine from aerosol spray droplets. The halogen contents of surface waters from Lake Superior and tributary streams and of aerosols from rural Michigan and the Niagara Falls vicinity are also being studied.

16053 APTIC NO. 34183

Yamate, Noboru

FORMATION OF OZONE BY IRRADIATION OF GASEOUS MIXTURE OF HYDROCARBON AND NITROGEN DIOXIDE AND OF AUTOMOBILE EXHAUST GAS. *(Tanka suiso to nisanka chisso kongo gasu narabi ni jidosha haiki gasu no koshosha ni yoru ozon no seisei ni tsuite). Text in Japanese. In: Studies on Formation of Hydrocarbon and Photochemical Reactive Material and their Influences. Joint Team for the Study of Photochemical Reactions, Tokyo (Japan), p. 1-10, April 1970.*

Experiments to test the formation of ozone using 10 ppm each of methane, propane, butene-1, and 1,3-butadiene, 0.5-10 ppm of nitrogen oxides, and diluted automobile exhaust gas are examined. A silica irradiation tube containing the gas mixture was irradiated at 20 A. Ozone concentration was measured at 350 millimicron and analyzed by the alkaline potassium iodide method. The concentrations of hydrocarbons and nitrogen oxides decreased with time of irradiation. For tests with automobile exhaust gas (1/50 air), olefin-type hydrocarbons and nitrogen oxides (nitric oxide and nitrogen dioxide) gradually decreased with time, but ozone concentration increased from 0.03 ppm after one hour to 0.06 ppm after four hours, determining that ozone is formed by a photochemical reaction of hydrocarbons and nitrogen oxides.

16054 APTIC NO. 33699

Yokoyama, Nagayuki

STATUS OF AIR POLLUTION IN RELATION TO THE DIFFUSION PHENOMENA. FIELD SURVEY OF DIFFUSION AND COUNTERMEASURE FOR POLLUTION. *(Taiki kakusan gensho to osen no taiyo--taiki kakusan genchi chosa to osen taisaku). Text in Japanese. Kogai To Taisaku (J. Pollution Control), 7(10):33-37, 1971. 8 refs.*

Dispersion experiments conducted so far have been limited to up to 10 km distance and 30 60 min duration; but as the scale of dispersion becomes larger, the pattern of dispersion becomes much more complex. According to the tracer experiments, various meteorological elements and pollution dispersion patterns have definite relationships: wind velocity, advection, and the shifting of the smoke center; turbulence intensity and dispersion width; wind velocity gradient and the birth of mechanical turbulence; temperature gradient, the birth of thermal turbulence, and convection; turbulence scale, dispersion index, and the turning point of dispersion phases; wind direction shear and the horizontal dispersion. The present systems of instant air pollution control were developed with: Field dispersion experiments and meteorological investigations, establishment of the dispersion pattern of that area, and determination of multiple pollutant concentration giving a control model; a field tracer experiment and weather investigation, wind tunnel experiments, a prediction of the future and determination of pollution concentration under a given condition giving a control policy; investigation of pollution sources, a wind tunnel experiment and index experiment, and determination of pollution concentrations under a given condition and at various conditions yielding an instant control method and abatement plans at the pollution sources.

16055 APTIC NO. 33520

Zhavoronkina, T. K.

THE CHEMICAL COMPOSITION OF ATMOSPHERIC PRECIPITATION. *Meteorol. i Gidrol., no. 9:22-24, 1958. 5 refs. Translated from Russian. Joint Publications Research Service, Washington, D. C., 6p., Feb. 18, 1959.*

NTIS: 59-13,224, JRS L-657-N

More than 600 samples of atmospheric precipitation were analyzed. The primary interest was the amount of chlorine, magnesium, and sodium contained in atmospheric precipitation. Chlorine was measured by spectral analysis. Seasonal changes in the percentages of chloride and sodium were seen. During the summer and winter seasons the greatest salt concentration in precipitation was observed in the coastal area while in the mainland interior the concentration was much less. This is an indication that the atmosphere derives its salt from the sea. The chloride content in precipitation is greater in the winter than in the summer, which is related to the prevalence of storms and strong atmospheric circulation.

BASIC SCIENCE AND TECHNOLOGY

16056 APTIC NO. 33960

Air Pollution Control Office, Research Triangle Park, N. C., Air Pollution Technical Information Center

AIR POLLUTION ASPECTS OF EMISSION SOURCES: NITRIC ACID MANUFACTURING - A BIBLIOGRAPHY WITH ABSTRACTS. *Pub. AP-93, 31p., May 1971. 81 refs.*

An annotated bibliography on all phases of nitric acid manufacturing is presented in which subject and author indexes refer to the abstracts by category letter and Air Pollution Technical Information Center accession number. Categories include emission sources, control methods, measurement methods, air quality measurements, atmospheric interaction, basic science and technology, standards and criteria, legal and administrative, social aspects, and general aspects. Other categories include effects on human health, plants and livestock, materials, and economics.

16057 APTIC NO. 34020

Artamonov, E. S. and L. A. Sazonov

CATALYTIC ACTIVITY OF RARE EARTH OXIDES IN THE CONVERSION OF CARBON MONOXIDE. *(Kataliticheskaya aktivnost okislov redkozemelnykh elementov v reaktsii okisleniya okisi ugleroda). Text in Russian. Kinetika i Kataliz, 12(4):961-968, 1971. 7 refs.*

The catalytic effects of rare element oxides such as on the conversion of carbon(14) labeled carbon monoxide at temperatures ranging between 250 and 440 C were investigated. The highest reaction rates (according to carbon dioxide desorption) occurred in the presence of oxides of elements provided with the most stable electron shell configurations. The catalytic properties of the studied oxides were closely related to the structure of the four f electron shell of their constituents. This structure was reflected in the variations in activation energies as well as in the surface oxygen bond energy. This latter was a determining factor for the variation in CO2 desorption energies within the investigated series of catalysts. The formation of carbonate like compounds on the surface of other oxides decreased their catalytic activity. A tentative sketch of the reaction mechanism for the conversion of CO is presented.

16058 APTIC NO. 33992

Baiamonte, Vernon D., Lynne G. Hartshorn, and Edward J. Bair

OZONE ULTRAVIOLET PHOTOLYSIS. III. DISPOSITION OF VIBRATIONAL ENERGY. *J. Chem. Phys., 55(8):3617-3623, Oct. 15, 1971. 21 refs.*

The origin of vibrationally excited molecular oxygen is examined, as well as the accompanying changes in ozone absorbance, in order to determine their relationship to the products of the O(1-D) plus O3 reaction and to subsequent O3 decomposition. A 3-m grating spectrometer was used for photographic spectra as well as photoelectric kinetics measurements. The extent of primary photolysis was determined by the intermediate quantum yield procedure. Under marginally isothermal and nonisothermal conditions ozone is excited to a nonequilibrium energy distribution, probably by vibration--vibration energy transfer from O2. The rates of all processes having an activation energy are enchanced by this excitation. (Author abstract modified)

16059 APTIC NO. 33775

Baryshnikov, Iu. N., G. A. Alexandrov, G. I. Vesnovskaia, and T. N. Konovalova

KINETICS OF CATALYTIC NAPHTHALENE OXIDATION PROMOTED BY SULPHUR DIOXIDE. *(Kinetika kataliticheskogo okisleniya naftalina promotirovannogo dobavkami semistogo angidrida). Text in Russian. Dokl. Akad. Nauk SSSR, 2000(2):336-338, 1971. 10 refs.*

Some phenomenological characteristics were studied of the catalytic oxidation of naphthalene on a complex V-K-sulfate-silica gel catalyst after the impulse introduction of a promoter (sulfur dioxide) into naphthalene-air-mixture. Phthalic anhydride formed 94% of the reaction products. The promoting effect of SO2 was accompanied by increased activity and selectivity of the catalyst towards phthalic anhydride formation; the process was of the first order with respect to naphthalene. The effect of SO2 on the catalyst s activity varied according to whether the catalyst is freshly prepared, previously used, or unused. With the freshly prepared catalyst, increased activity is observed (two maxima on the conversion degree versus time curves), while on the stale catalyst only one maximum is seen. The duration of the SO2 promoting effect increases linearly with SO2 concentration, but further SO2 addition after its concentration reaches two percent has little effect. The appearance of two maxima on kinetic curves of a fresh catalyst is explained. During naphthalene oxidation, sulfuric acid is formed which reacts with the sulfate component of the catalyst to give a more active sulfate phase, which increases the availability of active centers in the surface catalyst layer. Thus the second maximum occurs. Micropores of the stale catalyst granules are blocked by oxidation products which hinder the reaction of H2SO4 with sulfate; thus, the second maximum is missing.

16060 APTIC NO. 33629

Beck, H. V.

CRITICAL FLOW NOZZLES FOR GAS MEASUREMENT. *Gas, 47(9):49-51, Sept. 1971.*

Great interest is being shown in measuring gaseous fluids with critical flow nozzles. Flow through a critical flow nozzle is a direct function of upstream pressure and temperature condition. As such, it is substantially immune to pulsation conditions that can plague an orifice meter. It does require a pressure drop of about 50% from the inlet to the throat, but nozzles built with a divergent cone downstream of the throat will reclaim a major portion of the drop. While more expensive to make, such a nozzle permits critical flow measurements with only 1-15% overall pressure loss. In this way, precise gas measurements can be made when, for example, taking gas out of a 100-psig pipe and discharging it into an 85-psig line. Convergent-divergent nozzles have discharge coefficients of 0.99%, or higher, which leaves one percent, or less, subject to computation. Confirming tests on protypes indicate this to be a very accurate way of generating a standard flow.

16061 APTIC NO. 33752

Bell, F. A., R. S. Lehrle, and J. C. Robb

POLYACRYLONITRILE DEGRADATION KINETICS STUDIED BY THE MICROPYROLYSIS-G.L.C. TECHNIQUE. *Polymer, 12(9):579-599, Sept. 1971. 40 refs.*

The thermal degradation of thin films of polyacrylonitrile (thickness approximately 750 A) was studied at 200-850 C by the micropyrolysis-gas-liquid chromatographic technique. Throughout the temperature range 300-850 C, the following products were characterized: ammonia, hydrogen cyanide, monomer, acetonitrile, and methacrylonitrile. Studies of the limiting yields of productions, the conversion curves and kinetics of the evolution of some of the products, the influence of water on degradation, and stoichiometric considerations indicated the occurrence of three independent processes: ammonia evolution, possibly by a stepwise process leaving a laddered polymer containing some five-membered rings; hydrogen cyanide evolution, either from head-to-head linkages or by a chain reaction, leaving double bonds randomly within the polymer molecules; and monomer evolution by a depropagation process, involving intermolecular and intramolecular transfer steps leading to acetonitrile and methylonitrile production. A fourth independent process was the only one observed at 200 C; this is probably a laddering process leading to stabilization of the polymer toward subsequent degradation at high temperatures. High-temperature kinetic studies of polymer samples preheated at 200 C indicated the limitations of the stabilization process and showed that unladdered parts of the polymer degrade in the same way as a normal polymer.

16062 APTIC NO. 33489

Bricard, J.

FIXATION OF SMALL IONS ON AEROSOL PARTICLES IN A UNIPOLAR MEDIUM. *(Fixation des petits ions sur les particules d aerosol dans le milieu unipolaire). Text in French. Preprint, Faculte des Sciences de Paris (France), p. 1-17, 1968. 17 refs. (Presented at the Seminar de Physique des Aerosols, Paris, France, 1968.)*

Kinetic theory assumes that the particle capturing the charge is stationary and not subjected to thermal agitation, thus limiting its validity for small ions. Equations for the calculation of the number of ions capturing a particle per second and the ionic fixation coefficient in an ionized unipolar medium subjected to a known non-uniform electric potential are derived and compared with the experimental results of Sayers and Machler on the recombination of small ions. Mathematical analysis of the fixation of aerosol particles exposed to an ionized electric field revealed that the effect of an external electric field diminished with the particle radius and was negligible in comparison with kinetic forces below a particle radius of 0.00001 cm. The applicability of kinetic theory to the establishment of ionic concentrations in the vicinity of a charged particle is analyzed in the light of the Gentry and Brock theory.

16063 APTIC NO. 33410

Clift, R. and W. H. Gauvin

MOTION OF ENTRAINED PARTICLES IN GAS STREAMS. *Can. J. Chem. Eng., 49(4):439-448, Aug. 1971. 98 refs. (Presented at the International Powder Technology and Bulk Solids Conference, Harrogate, England, May 12-14, 1971.)*

Recent work on the drag experienced by an entrained particle in relative motion through a fluid is reviewed. Although current understanding is in no sense complete, it is clear that fluid turbulence, acceleration, particle shape, orientation, and particle-fluid mass transfer significantly effect the value of the drag force. This is particularly true when nonidealities cause a change in the flow pattern around a particle, as shown by the influence of turbulence and relative acceleration in the region of the critical Reynolds number. Solutions of equations of fluid motion are leading to greatly improved understanding of fluid-particle interaction at low Reynolds numbers. Developments have been less rapid in the higher Reynolds numbers which are of equal practical interest. Possible directions for future work are suggested.

16064 APTIC NO. 34051

Dahneke, Barton

THE CAPTURE OF AEROSOL PARTICLES BY SURFACES. *J. Colloid Interface Sci., 37(2):342-353, Oct. 1971. 22 refs. (Presented at the American Chemical Society, National Meeting, 160th, Symposium on Size, Shape, and Surface Area of Colloidal Particles and Aggregates, Chicago, Sept., 1970.)*

The mechanics of a solid particle and solid surface collision are examined. An expression relating reflected and incident velocity, containing two parameters, i.e., the coefficient of restitution and the particle-surface interaction energy, was derived. Values for the particle capture limit, i.e., the range of system properties such as particle size, velocity, and interaction energy within which particle capture occurs, were determined. The coefficient of restitution and the estimate of particle-surface interaction energy were used to calculate particle capture limits for silica and polystyrene particles. The capture of particles on thin plates and cylinders, representing fiber filter elements, was examined; an additional mechanism of energy dissipation is described for these. Design characteristics of a filter element are discussed with respect to capture efficiency. (Author abstract modified)

16065 APTIC NO. 33644

Derrick, P. J. and I. Szabo

ION-MOLECULE REACTIONS IN CARBON MONOXIDE INVESTIGATED BY CHARGE EXCHANGE MASS

SPECTROMETRY. Int. J. Mass Spectrom. Ion Phys., 4(7):71-78, 1971. 24 refs.

Ion-molecule reactions in carbon monoxide were investigated by charge-exchange mass spectrometry so that the role of different electronic states of CO(+) in the reactions could be directly observed. Collision chamber pressures were 0.01 to 0.0001 torr. The ground state, CO(+) Chi(2)Sigma(+), underwent no reaction with CO except perhaps charge exchange. The excited states, CO(+) Alpha(2)Pi and CO(+) Beta(2)Sigma(+), reacted with CO to form C(+), C2O(+) and CO2(+), and C(+) and C2O(+),, respectively. Experimental rate constants and phenomenological cross-sections for reactions of different states of CO(+) with CO are reported. Formation of secondary CO2(+) from primary CO(+) is also discussed. (Author abstract modified)

16066 APTIC NO. 33541

Dormostuchenko, G. M.

DETERMINATION OF STATISTICAL CHARACTERISTICS OF MOVEMENT OF A SUSPENDED PARTICLE ON THE BASIS OF STATISTICAL CHARACTERISTICS OF FLOW. *(Opredyeleniye statisticheskikh kharakteristik dvizheniya vzveshennoy chastitsy po statisticheskim kharakteristikam potoka). Text in Russian. Meteorol. Klimatol. I Gidrol., no. 4:39-48, 1969. 13 refs.*

A method of the determination of statistical characteristics of the motion of suspended particles in a turbulent flow from statistical characteristics of the flow is shown. Previously described differential equations describing motion of solid suspended particles in a fluid pulsating stream were used, specifically in the case of slowly pulsating turbulent flows of low Reynolds numbers(1-10). Using equations and the method of random functions, the moments of the first two orders of a random function were obtained, which characterize the velocity of movement of the suspended particle.

16067 APTIC NO. 33422

DuBois, Arthur B.

IMPAIRMENT OF PULMONARY MECHANICS. *Arch. Environ. Health, vol. 6:133-136, Jan. 1963. (Presented at the Conference on Respiratory Diseases in Industry, Skytop, Pa., May 14-16, 1962.)*

There are three main types of impaired pulmonary mechanics: obstruction of the airways, restriction of lung expansion, and uneven rates of expansion throughout the lung. Partial obstruction of the lower airways is accompanied by the need to produce an increased pressure gradient between the mouth and alveoli to move air at a normal rate of volume flow in and out of the alveoli. The term airway resistance has been used to describe the ratio of the alveolar pressure to the rate of air flow. To measure the rate of air flow in determining the amount of airway resistance in the lungs, a pneumotachygraph is used. Physiologically, restriction of lung expansion is accompanied by the need to produce increased pressure difference between the mouth and the intrapleural space to expand the lung to a normal end-inspiratory volume. The term lung compliance has been used to describe the ratio of volume change to transpulmonary pressure change. The volume change is recorded by a spirometer or a pneumotachygraph with a flow integrater attached. In uneven dilution, the volume change divided by the volume of one region of the lung does not equal the volume change divided by the volume of another region. The term unequal time constants has been used to describe the time lag of one part relative to another. To measure the degree of unevenness of dilution ratios, one may test the degree to which gases have been diluted during inspiration by analyzing the gas expired, using a rapid gas analyzer to record concentrations in different fractions of the gas expired.

16068 APTIC NO. 33540

Gordier, Robert L.

STUDIES ON FLUID JETS DISCHARGING NORMALLY INTO MOVING LIQUID. *Minnesota Univ., St. Anthony Falls Hydraulic Lab., Contract Nonr 710(26) Tech. Paper 28, Ser B, 48p., Aug. 1959. 16 refs.*

Results of tests on circular water and air-water mixture jets impinging normally into a water tunnel flow are given. The penetrating ability and spreading of high velocity jets impinging into a moving liquid have proven of interest for a variety of reasons ranging from the production of underwater bubble screens to the cooling ability of air jets for turbo-jet engines. Data taken on jet penetration are in agreement with results of previous experiments conducted in wind tunnels at jet-tunnel velocity ratios of six and less. A secondary effect is present at higher velocity ratios, so the penetration is deeper than previously indicated. An empirical penetration parameter developed by the National Advisory Committee for Aeronautics may be used for correlation of air-water mixture penetration data, if the orifice is considered reduced in size by an amount equal to the area occupied by the air bubbles. Entrainment of external flow is shown photographically, indicating that entrainment from the wake of the jet proceeds in a periodic manner. Total pressure data are in qualitative agreement with previous experiments conducted in wind tunnels; these show the characteristic kidney-shaped deformation predicted theoretically by Lu and Fraser. An analysis of the two-dimensional or slot jet is presented for the case where the two flows are under the same total pressure. Comparison with penetration data on three-dimensional jets indicates that the rapid flattening of the jet gives it a quasi two-dimensional character. (Author abstract)

16069 APTIC NO. 33875

Guillou, M., A. Lecante, and M. Grunberg

AN ELECTROTHERMAL OXYGEN PUMP. *(La pompe electrothermique a oxygene). Text in French. Rev. Gen. Thermique (Paris), no. 97:27-33, Jan. 1970. 7 refs. (Presented at the Reunion d Etude de la Section S.F.T., Conversion de l Energie par les Piles a Combustible et la M.H.D., Jan. 24, 1969.)*

The utilization of oxygen exchange characteristics of stable or semistable oxides like iron, cobalt, nickel, and manganese oxides, whose cations possess several valence degrees, for the production of oxygen by the alternating application of heat (decomposition) and cold (reoxygenation) is not practicable because of the sluggish kinetics of the reaction. A more promising approach involves the use of semiconductor properties of refractory oxides like zircon oxide which can be exposed to much higher temperatures than the above oxides. The binary oxide (Zr02)0.85(CaO)0.15 forms an oxygen cell in which high temperature induces an electric current equivalent to the internal resistance and an oxygen ion circulation from the cold (1300 K) towards the warm wall of the cell (2000 K). Chemical analysis by absorption in pyrogallic acid revealed after 12 hours an oxygen enrichment of the air on the hot side of the cell by 2%. Pilot plant tests should disclose whether such solid electrolyte conductors could be used as oxygen generators on a large scale.

16070 APTIC NO. 33357

Ivchenko, I. N., Yu. I. Yalamov, and Ya. I. Rabinovich

THEORETICAL AND EXPERIMENTAL STUDY OF THE THERMOPHORESIS OF AEROSOL PARTICLES FOR LARGE KNUDSEN NUMBERS. *Russ. J. Phys. Chem. (English translation from Russian of: Zh. Fiz. Khim., 45(3):320-322, March 1971. 16 refs.*

The choice of method applicable in the theoretical analysis of the phenomenon of thermophoresis is determined by the Knudsen number: Kn equal to lambda/R, where lambda is the free path of the gas molecules and R the radius of a spherical aerosol particle. A theoretical and experimental study of thermophoresis for large Knudsen numbers is presented.

16071 APTIC NO. 33991

James, Thomas C.

TRANSITION MOMENTS, FRANCK-CONDON FACTORS, AND LIFETIMES OF FORBIDDEN TRANSITIONS. CALCULATION OF THE INTENSITY OF THE CAMERON SYSTEM OF CO. *J. Chem. Phys., 55(8):4118-4124, Oct. 15, 1971. 16 refs.*

The factors affecting the intensity of forbidden transitions in diatomic molecules are discussed. The intensity of the Cameron bands can be adequately explained as arising from the spin-orbit mixing between the upper state of the Cameron system with the upper state of the fourth-positive system. The calculated oscillator strength is in good agreement with measurements of total band absorption intensities. The range of lifetimes for the three-Pi components makes direct comparison with lifetime measurements more uncertain. The intensity of the O, O and 1, O bands of the a3-Pi(-1)Sigma Cameron system of carbon monoxide were calculated using perturbation theory. (Author abstract modified)

16072 APTIC NO. 33830

Just, T. and P. Roth

MEASUREMENTS OF CO RELAXATION IN AN UNSTEADY EXPANSION WAVE. *J. Chem. Phys., 55(5):2395-2399, Sept. 1, 1971. 16 refs.*

Vibrational relaxation of various carbon monoxide-argon mixtures in an unsteady expansion wave was measured using an infrared technique. At the observation window, pressure and vibrational temperature were measured as functions of time. The inner diameter of the shock and expansion tube was 75 mm, so that the boundary layer effects could be kept small. The second diaphragm, which separates shock and expansion tubes before the experiments, was chosen as thin as possible. An aluminum foil of six to eight micron thickness was suitable. Emission and absorption measurements were made simultaneously, using a suitable shaped cavity in an uniformly heated graphite body as a reference radiation source for the absorption measurements. Results indicated no deviations from the values predicted using the Landau-Teller model. (Author abstract modified)

16073 APTIC NO. 33459

Kelley, Richard D., Ralph Klein, and Milton D. Scheer

REACTIONS IN THE LOW TEMPERATURE REGION INVESTIGATED. *Nat. Bur. Std. (U. S.), Tech. News Bull., 54(6):119-120, June 1970. 6 refs.*

Studies of low temperature reactions applied to elucidation of the elementary steps in olefin oxidation and hydrogenation are described. The investigations were performed in the low 77-90 K region to reduce the complexity of the overall reaction by avoiding all high activation energy secondary reactions. The reactions of atomic hydrogen and atomic oxygen with olefins were examined by condensing a layer of the olefins, either with or without an inert diluent such as propane, at a temperature of 90 K. The layer is exposed to atomic hydrogen or oxygen in the gas phase, prepared by thermal dissociation of molecular hydrogen or oxygen on a heated filament of tungsten or rhenium, respectively. After an appropriate time interval, the filament is cooled, the excess gas pumped away, and the condensed layer transferred by distillation to a gas chromatograph for analysis. An isotope effect was manifested in the positional rate ratio difference between the reactions of hydrogen and deuterium with an olefin. This is a remarkably large isotope effect for an addition reaction, and is attributed to tunneling.

16074 APTIC NO. 34168

King, Keith D., David M. Golden, and Sidney W. Benson

THERMOCHEMISTRY OF THE GAS-PHASE EQUILIBRIUM CH3COCH3 + BR2 EQUALS CH3COCH2BR + HBR. THE ENTHALPY OF FORMATION OF BROMOACETONE. *J. Chem. Thermodyn., vol. 3:129-134, 1971. 15 refs.*

The equilibrium constant for the gas phase reaction: acetone plus bromine equal to bromoacetone plus hydrogen bromide, was measured spectrophotometrically over the temperature range 516 to 618 K. Any temperature variation of the equilibrium constant was masked by the large scatter in the results; the results were better when subjected to a third-law treatment. Bromoacetone was less stable than predicted by both bond additivity and the atom substitution rule; this relative instability is presented as further evidence for intramolecular dipolar effects of alpha-halogenated ketones. The enthalpy of formation of bromoacetone combined with a previous determination for the enthalpy of formation of CH3COCH2 leads to a C-Br bond dissociation energy of 64.2 plus or minus 2.7 kcal inverse mol.

16075 APTIC NO. 33689

Locht, R. and J. Momigny

MASS SPECTROMETRIC STUDY OF ION-PAIR PROCESSES IN DIATOMIC MOLECULES: H2, CO, NO AND 02. *Int. J. Mass Spectrom. Ion Phys., 4(7):121-144, 1971. 35 refs.*

The appearance of ion-pair processes were studied in hydrogen, carbon monoxide, nitric oxide, and oxygen. The different thresholds successively observed for each process were interpreted. Using the results from the convolution of theoretical models of the ionization efficiency curves and the deconvolution of their first differential, it was possible to propose the following: a method for the determination of the threshold energy of an ion-pair process; to show that, except for H2, the shape of the cross-section of an ion-pair process as a function of the electron excess energy is a step-function; and to determine the kinetic energy distribution of the negative ions and consequently to form an idea about the relative position of the potential energy curves of the excited states of the molecule, decaying by ion-pair process, with respect to the ground state of the molecule. The analysis suggests that, for CO and NO, some of the observed absorption bands, labelled by Tanaka as P-sub i, (i equal to 1-5), might be related to the existence of some excited states of these molecules, correlated with an ion-pair as dissociation products. (Author abstract)

16076 APTIC NO. 33813

Lorquet, J. C. and C. Cadet

EXCITED STATES OF GASEOUS IONS. I. SELECTION RULES IN PHOTOELECTRON SPECTROSCOPY AND PHOTOIONIZATION. THE CASE OF N2O+. *Int. J. Mass Spectrom. Ion Phys., 7(3):245-254, Sept. 1971. 18 refs.*

The range of validity of a selection rule was examined which, in photoionization experiments and photoelectron spectroscopy, forbids any transition to the ionic states the electronic configuration of which differs from that of the ground state of the neutral molecule by more than one molecular orbital. This rule is shown to constitute a convenient first approximation only. If configuration interaction is taken into account, weak transitions to doubly orthogonal states may become allowed. Calculations were performed in the case of some electronic states of the nitrous oxide(+) ion. A correlation diagram representing roughly the general features of the potential energy surfaces of the N2O(+) ion is also given; it involves several conical intersections or near-intersections. (Author abstract modified)

16077 *APTIC NO. 34210*

Meisel, S. L.

A PROGRESS REPORT ON THE IIEC (INTER-INDUSTRY EMISSION CONTROL PROGRAM). Preprint, National Petroleum Refiners Association, Washington, D. C., 4p., 1970. (Presented at the National Petroleum Refiners Association, Annual Meeting, San Antonio, Tex., April 5-7, 1970, Paper AM-70-5.)

The purpose of the Inter-Industry Emission Control program (IIEC) is to eliminate automotive air pollution as rapidly as possible by producing an automotive engine and fuel combination that would help restore air quality in the worse U. S. air basin Los Angeles County to pre-World War II levels. Since the formation of the IIEC in April 1967, 17 research projects directly involving emission control were set up. On-going projects include catalysts for controlling emission of hydrocarbons and carbon monoxide with several fuel formulations, catalysts for controlling nitrogen oxides, mathematical modeling of thermel reactor and catalytic systems, development of low cost thermal reactor materials, recirculation of exhaust gas to control nitrogen oxides, and development of concept vehicles. Three basic systems are under study. In the first, the thermal reactor system replaces the exhaust manifold with an afterburner into which air is injected. In the second, the thermal reactor function is replaced by a metal chamber containing a catalyst; the third system is the same except that nitrogen oxide is controlled by a second catalyst chamber that converts nitrogen oxides back to nitrogen.

16078 APTIC NO. 33316

Melvas, Bengt

PCB - SYNTHESIS AND RADIOACTIVE LABELLING (EQUAL TO OR GREATER THAN 4 CL - ATOMS). *National Swedish Environment Protection Board, Solna, Research Secretariat, Proc. PCB Conf., Stockholm, Sweden, Dec. 1970, p. 69-73. 3 refs. (Sept. 29.)*

Possible routes for the labelling of polychlorinated biphenyls (PCB) were investigated. Synthesis is carried out on a small scale because of the cost and the hazards with radioactive material. The hazards with C-14 labelled compounds forces a synthesis which minimizes exposure of the personnel. The expense of the starting material demands a very good yield in each step. The choice of starting material is restricted. Benzene, nitrobenzene, chlorobenzene, and aniline were used as starting materials. The four syntheses described were the formation of PCB from nitrobenzene reduced with zinc dust and sodium hydroxide to give hydrabenzene which rearranges to benzidine with hydrochloric acid. Benzidine is acetylated and then chlorinated to form tetrachlorobiphenyl. The second synthesis was a Grignard reaction with bromobenzene to form biphenyl which is subsequently chlorinated to form PCB. In the third synthesis, by Ullmann coupling in copper bromide, 1-chloro-2,4-dinitrobenzene is condensed to 2,4,2 prime,4 prime-tetranitrobiphenyl. In the fourth synthesis, 2,4-dichloroaniline is diazotized in concentrated sulfuric acid. The azocompound is put into potassium iodide solution drop by drop. The 1-iodo-2,4-dichlorobenzene formed gives 2,4,2 prime,4 prime-tetrachlorobiphenyl with an Ullmann coupling.

16079 APTIC NO. 34203

Meyer, B., Y. Jones, J. J. Smith, and K. Spitzer

THE SPECTRUM OF MATRIX-ISOLATED GEO AND GES. *J. Mol. Spectr., 37(1):100-108, Jan. 1971. 24 refs.*

The spectrum of germanium oxide and germanium sulfide was studied in the 14,000 to 50,000 reciprocal cm region in argon, krypton, xenon, oxygen, sulfur hexafluoride, and methane at 20 K. In both molecules the first absorption system was observed. The analysis of the spectrum of GeS corresponds to that in the gas phase. For GeO in xenon, vibrational bands to the red of the gas phase are found. This suggests that the gas phase numbering should be corrected by plus one. In both molecules excitation into the A state yields phosphorescence in the visible. The phosphorescence results from matrix-induced intersystem crossing. Absorption and emission shifts are consistent with the external heavy atom effect. The spectrum of matrix-isolated GeO and GeS is in all respects analogous to that of SnO and SnS.

16080 APTIC NO. 33863

Miles, F. W.

URBAN NUCLEAR ENERGY CENTER STUDY: ESTIMATES OF PROCESS STEAM CONSUMPTION BY MANUFACTURING INDUSTRIES IN THE UNITED STATES FOR THE YEAR 1980. *Oak Ridge National Lab., Tenn., Chemical Technology Div. and Oak Ridge National Lab., Tenn., Reactor Div., Dept. of Housing and Urban Development Contract W-7405-eng-26, 19p., Jan. 1970. 15 refs.*

NTIS: ORNL-HUD-2

Estimates were made of the consumption of process steam by manufacturing industries in the Unites States for the year 1980 as part of a program for evaluating the usefulness of urban nuclear energy centers. Perazich-type assumptions were made with respect to the use of steam by the selected industries, which included the food operations industry, paper manufacturing, chemicals industry, petroleum refining, rubber and miscellaneous plastic products, and their related fields. Steam consumption in 1962 was estimated by several methods from fuel consumption data in the Census of Manufacturers. The values were projected to 1980 by using energy consumption projections. The estimates of steam consumption varied from 67.6 times 10 to the 14th power Btu to 95.4 times 10 to the 14th power Btu, depending on the methods and assumptions employed. This estimated consumption of steam by manufacturing industries is approximately equal to the 92 times 10 to the 14th power Btu of electrical energy estimated to be required in 1980. Therefore, a significant amount of thermal energy from an urban nuclear energy center would be consumed by manufacturing industries if the area served by the center had a fraction of the country s steam-using industries equal to its fraction of the country s population. (Author abstract modified)

16081 APTIC NO. 33792

Moddeman, W. E., W. E. Bull, Thomas A. Carlson, Manfred O. Krause, B. P. Pullen and G. K. Schweitzer

DETERMINATION OF THE K-LL AUGER SPECTRA OF N2, O2, CO, NO, H2O, AND CO2. *J. Chem. Phys., 55(5):2317-2336, Sept. 1, 1971. 30 refs.*

A double-focusing electrostatic electron spectrometer was used to measure the K-LL Auger spectra resulting from electron impact for each of the elements in the gaseous molecules nitrogen, oxygen, carbon monoxide, nitric oxide, water, and carbon dioxide. An energy resolution of 0.09% full width half-maximum was normally employed. A method for analyzing these complex spectra is described. It involves the identification of normal and satellite lines. The former are defined as arising from single electron ionization from the K shell without additional excitation followed by an Auger process in which one electron fills the vacancy while a second goes into the continuum, and all the other electrons remain in their same orbitals. Satellite lines result when extra excitation occurs either in the initial form of the K vacancy or in the subsequent Auger process. To aid in the identification of these satellite lines, auxiliary experiments were performed such as the study of discrete energy losses in photoionization due to electron shake-up, and the comparison of Auger spectra produced by monoenergetic x-rays. Information was obtained on the nature of initial excitation processes such as the transition of a K electron into excited discrete states and monopole excitation, and the identification of the energy and nature of the ground and excited states of the doubly charged molecular ions. The second ionization potential was obtained for each of the molecules, and in on case nitrogen, the third ionization potential was estimated. (Author abstract modified)

16082 APTIC NO. 33818

Newton, A. S. and G. E. Thomas

ELECTRON IMPACT EXCITATION FUNCTIONS OF RADIATING AND METASTABLE STATES OF CARBON MONOXIDE. *Chem. Phys. Letters (Amsterdam), 11(2):171-174, Oct. 1, 1971. 21 refs.*

Excitation functions near threshold were measured for the production of photons and for the production of long-lived metastable molecules from carbon monoxide. An interesting peaked feature exists at the threshold for photon production. A molecular beam apparatus and an electron gun were utilized in this time-of-flight technique. In order to clarify the nature of the peaked feature observed here, it would be useful to measure the wavelength distribution of the emitted light. A second useful experiment might be to search for a resonance in CO in the energy range between seven and eight eV. (Author abstract modified)

16083 APTIC NO. 34204

Oommen, Thottathil V.

SPECTRA AND REACTIONS OF ELEMENTAL SULFUR. *Washington Univ., Seattle, Dept. of Chemistry, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1970, 213p. 86 refs.*

The electronic spectrum of elemental sulfur in solution, in a single crystal, in the vapor phase, and in liquid form was investigated at various temperatures. The study focuses on the temperature-dependent shift of the absorption edge of pure sulfur and proposes for the first time an explanation for the color change of liquid sulfur in the temperature range above 160 C. This change is a combination of the shift of the absorption edge of S8 and the absorption due to high-temperature species, probably S4 or S3. A short exploratory study on fluorosulfanes is reported which confirms that fluorosulfanes can be prepared for silver fluoride and elemental sulfur, and indicates that species containing four or more atoms in a chain can be prepared. Properties and the preparation of diatomic sulfides are also summarized. (Author abstract modified)

16084 APTIC NO. 33604

Ott, W. Richard and Malcolm G. McLaren

SUBSOLIDUS STUDIES IN THE SYSTEM PBO-SI02. *J. Am. Ceram. Soc., 53(7):374-375, July 1970. 13 refs. (Presented at The American Ceramic Society, Annual Meeting, 71st, Washington, D. C., May 7, 1969.)*

The subsolidus region of the lead monoxide-silicon dioxide system was studied by DTA and X-ray diffraction. X-ray diffraction analysis showed the presence of five compounds: 4PbO.SiO2, 3PbO.SiO2, 2PbO.SiO2, 3PbO.2SiO2, and PbO.SiO2. The compound 4PbO.SiO2 has been previously reported to have three polymorphic forms; there are two polymorphs of 2PbO.SiO2 with the inversion at 460 plus or minus 15 C. The three to one and three to two compounds were unstable above 430 plus or minus 10 C and 585 plus or minus 15 C, respectively. PbO.SiO2 was unstable below 525 plus or minus 15 C. DTA patterns were determined for glasses of the composition of each of these compounds. The behavior of lead silicate glasses in a dynamic situation is very significant in analyzing the reactions which occur as heat is applied to a glass batch. (Author abstract modified)

16085 APTIC NO. 33909

Ravnihar, Bozena

EPIDEMIOLOGY OF LUNG CANCER IN SLOVENIA AND ELEMENTS FOR ESTIMATING THE COSTS OF MEDICAL CARE FOR LUNG CANCER PATIENTS. *(Epidemiologija pljucnega raka v Sloveniji in osnovni podatki za oceno stroskov zdravstvene sokrbe bolnikov s tem rakom). Text in Slovenian. Zdrav. Vestn. (Ljubljana), 39(1):23-24, 1970.*

A statistical analysis of data on lung cancer incidence and mortality in Slovenia (population 1,700,00) and data on survival experience with lung cancer patients is presented. Lung cancer incidence and mortality rates increased very steeply during 1955-1964, and the annual number of new cases and that of the deceased during this period almost doubled. The increase in lung cancer cannot be attributed to lengthened life expectancy of the population. The disease attacked males far more frequently than females; the ratio in incidence rates between the two sexes was 7.1:1 in 1964. Survival rates one to five years following the diagnosis for cases diagnosed during 1957-1960 are given. Therapeutic results improved in recent years but generally remain poor, strongly suggesting that lung cancer control efforts should be directed towards prevention. The elements of medical care of lung cancer patients, which might serve as a basis for the estimation of lung cancer management costs, were also studied. The kinds and number of diagnostic and treatment methods, the hospitals in which these cases were diagnosed and/or treated, the the hospitalization period and number of followup examinations are given. These data clearly show lung cancer presents difficult problems in medical management and is a heavy finanical burden to society.

16086 APTIC NO. 33690

Rosenstock, H. M.

HARMONIC OSCILLATOR FRANCK-CONDON FACTORS FOR THE IONIZATION OF N2O. *Int. J. Mass Spectrom. Ion Phys., 4(7):33-39, 1971. 7 refs.*

Harmonic oscillator Franck-Condon factors have been calculated for the ionization of nitrous oxide. The Franck-Condon factors are strongly dependent on the assumed force field. Further, it is shown that transitions involving a change in only one bond length can lead to progressions in both normal stretching modes. The results are in fair agreement with experimental values obtained by photoelectron spectroscopy. (Author abstract modified)

16087 APTIC NO. 34297

Singh Dev, Rajinder K. Kautz, and H. Kirsch

CRYSTAL STRUCTURAL PROCESSES AT THE REACTION OF SO3 AND SO2 WITH FLY ASH PARTICLES AND ADDITIVES. *(Kristallstrukturelle Vorgaenge bei der Reaktion von SO3 and SO2 mit Flugaschepartikeln und Additiven). Text in German. Mitt. Ver. Grosskesselbetr., 51(4):338-341, Aug. 1971. 4 refs.*

Sulfate formation through the reaction of carbonates and oxides of calcium, magnesium, iron, manganese, lead, and zinc with the sulfur dioxide and sulfur trioxide in flue gas was studied. Natural carbonate crystals were split and heated 10-15 C above their dissociation temperature. The sulfatization experiments were carried out with the crystal oxide aggregates obtained through calcination. Temperatures were between 500 and 600 C. Carbonates reacted faster and more efficiently with SO3 than the respective oxides. The oxide structure is thought to require more regrouping, while the SO3 group most likely replaces the carbon dioxide group in the carbonate structure. Oxides become more reactive as temperatures increase. Calcium carbonate and calcium monoxide most likely bind not only the SO3, but also the SO2, while magnesium carbonate and magnesium monoxide probably only bind SO3.

16088 APTIC NO. 34218

Solly, Richard K. and Sidney W. Benson

THERMOCHEMISTRY OF THE REACTION OF BENZALDEHYDE WITH IODINE. THE ENTHALPY OF FORMATION OF BENZALDEHYDE AND BENZOYL IODIDE. *J. Chem. Thermodyn., vol. 3:203-209, 1971. 14 refs.*

The gas-phase equilibrium of the reaction benzaldehyde (PhCHO) + iodine (I2) equals PhCIO + HI was investigated spectrophotometrically at 240 to 341 C. The calculated equilibrium constants are given. The agreement of constants computed from initial rates with those calculated from equilibrium partial pressures is evidence that the reaction stoichiometry is unchanged for the time required to reach equilibrium. Experimental values for enthalpies of fromation were 8.9 plus or minus 1.0 kcal/mol for PhCHO (g, 198 K) and 2.6 plus or minus 1.0 kcal/mol for PhCIO (g, 298 K). These values strongly support the calculations of Cox and Pilcher.

16089 APTIC NO. 33990

Stuhl, F. and H. Niki

MEASUREMENTS OF RATE CONSTANTS FOR TERMOLECULAR REACTIONS OF O(3P) WITH NO, O2, CO, N2, AND CO2 USING A PULSED VACUUM-UV PHOTOLYSIS-CHEMILUMINESCENT METHOD. *J. Chem. Phys., 55(8)3943-3953, Oct. 15, 1971. 37 refs.*

Absolute rate constants for a number of termolecular reactions of oxygen atoms were determined at 300 K. Oxygen atoms were generated by pulsed vacuum-ultraviolet photolyses of nitric oxide, molecular oxygen, carbon dioxide, and nitrous oxide and were monitored by nitrogen dioxide or carbon dioxide chemiluminescent emission. The decay of the O atoms, as monitored by the chemiluminescent emission, was exponential. (Author abstract modified)

16090 APTIC NO. 33743

Tretyakov, I. I., A. V. Sklyarov, and B. R. Shub

KINETICS AND THE MECHANISM OF CARBON MONOXIDE OXIDATION OVER PURE PALLADIUM. *(Kinetika i mechanism okisleniya okisi ugleroda na chistom palladii). Text in Russian. Kinetika i Kataliz, 12(4):996-1002, 1971. 15 refs.*

In keeping with the analogy between the catalytic properties of platinum (Pt) and palladium (Pd), the mechanism of the Pd-catalyzed carbon monoxide oxidation with oxygen was investigated. Experiments were carried out with spectroscopically pure Pd wire with a geometric surface of 0.16 sq cm heated by means of constant current; the pressure of the reagent gases ranged from 0.00001 to 0.1 torr and the temperature of the reaction ranged from 80 to 500 C. The order of the reaction changed from zero to first order under stoichiometric conditions and pressures of 0.0001 0.01 torr when the temperature increased from 127 to 320 C. Excess CO inhibited the reaction at lower temperatures when small excess of oxygen had enhancing effects. The rate of the reaction appeared to be determined by the number of molecular collisions of the compound used in lower amounts upon the catalytic surface between 250 and 400 C. The collision mechanism of the reaction is similar to the phenomena occurring in the Pt-catalyzed reaction. Further experiments revealed that the collision reaction occurred between the adsorbed atomic oxygen and the carbon monoxide of the gaseous phase. The inhibition of the reaction by large amounts of oxygen seemed to be due to a competitive chemisorption phenomenon between the atomic and molecular oxygen, occurring on the catalytic surface. Graphs expressing the kinetics of the reaction and an equation, describing the laws of this process are presented.

16091 APTIC NO. 34156

Vaska, L. and J. Peone, Jr.

A SIMPLE SYNTHETIC ROUTE TO D8 COMPLEXES OF RHODIUM AND IRIDIUM. AN ELECTRONEGATIVITY SCALE FOR ANIONIC LIGANDS. *Chem. Commun., no. 9:418-419, May 5, 1971. 3 refs.*

Molecular fluoro-complexes trans-(MF(CO)-(Ph3P)2) (M equals Iridium, Rhodium), undergo rapid substitution reactions to yield a variety of new derivatives, trans-(MA(CO)(Ph3P)2) (A equals univalent anionic ligand). A relationship between the carbonyl stretching frequencies and total electronegativity of A in these compounds is suggested. (Author summary modified)

16092 APTIC NO. 34157

Wasserman, E., V. J. Kuck, R. S. Hutton, E. D. Anderson, and W. A. Yager

HYPERFINE INTERACTIONS AND GEOMETRY OF METHYLENE C(13). *J. Chem. Phys., 54(9):4120-4121, May 1, 1971. 12 refs.*

The C(13) hyperfine structure in the electron paramagnetic resonance spectrum of the ground state triplet C(13)D2 at 4 K was observed. In addition to being the first observation of any hyperfine interaction in methylene, the results show that the substantially bent structure is independent of environment. Mixtures containing C(13)D2N2 and xenon were irradiated at 4 K to yield a spectrum in which the central peak of each triplet of lines is due to the 41% of C(12) in the diazirene. The presence of a single pair of lines due to a C(13) nucleus indicates that the triplet contains one carbon atom. The C(13) hyperfine splittings were 282, 281, and 177 Mc/sec. The invariance of the angle with a large change in the tightness of the site indicates that the matrix is not altering the geometry of the methylene appreciably.

16093 APTIC NO. 34150

Weiner, Norman D. and Alvin Felmeister

COMPARISON OF PHYSICAL MODELS USED TO EXPLAIN CONDENSATION EFFECTS IN LECITHIN-CHOLESTEROL MIXED FILMS. *J. Lipid Res., vol. 11:220-222, 1970. 4 refs.*

The apparent condensation effect observed with mixed monolayers of lecithin and cholesterol was examined with respect to both molecular interaction and molecular cavity models. For each, model equations are presented with predict the surface areas of the film components as a function of the mole fraction of each component. For mixed monolayers where linearity does not exist in plots of mean surface area vs., mole fraction, and where there are breaks in the curve at mole fraction values other than 0.5, the size of the cavities are not invariant with respect to mole fraction. (Author abstract modified)

16094 APTIC NO. 33789

Wentworth, W. E., E. Chen, and R. Freeman

THERMAL ELECTRON ATTACHMENT TO NITROUS OXIDE. *J. Chem. Phys., 55(5):2075-2078, Sept. 1, 1971. 14 refs.*

Thermal electron attachment to nitrous oxide was investigated in the range -66 to 215 C. The attachment was dissociative in nature with an activation energy of 10.4 plus or minus 0.4 kcal/mole. The activation energy is thought to arise from electron attachment to molecules thermally excited primarily in the bending mode. In an attempt to explain the activation energy a simple Morse function was employed. Potential energy as a function of internuclear distance for both nitrous oxide and N2O(-) was generated at different N2O bond angles. Thy potential surface has a minimum at a bond angle of approximately 160 deg. The electron affinity of N2O is estimated at 6.2 plus or minus 4 kcal from the calculated N2O(-) potential energy surface. This is in general agreement with other reported values. (Author abstract modified)

16095 APTIC NO. 33370

Yanagihara, Shigeru, Isamu Shimada, Fumitake Chizaka, and Keizo Saito

STUDIES ON PHOTOCHEMICAL REACTIONS. *(Kokagaku hanno ni kansuru kenkyu). Text in Japanese. Preprint, Society of Automotive Engineers of Japan, Inc., Tokyo, p. 145-150, 1971. 4 refs. (Presented at the Society of Automotive Engineers of Japan, Academic Conference, Tokyo, May 1971.)*

Experiments on automobile exhaust gas photochemical reactions were carried out using a smog chamber. With initial hydrocarbon concentration of 2 ppmc and nitrogen oxides 0.9 ppm, reactions of irradiation on variuous HC were observed. The NO, NO2, oxidants, and formaldehyde contents were measured. Generally, paraffin HC had slow reactions while olefin HC reacted relatively quickly. The degree of HC concentration influenced the formation of HCHO, but the nature of CH composition seemed to result in great variations of HCHO. Tests with various concentrations revealed that when HC was stable and NO was increased, the photochemical reaction was gradually deterred; when NO was stabilized, the reaction quickened with the increase of HC concentration. The initial concentration of NO had a great influence on formation of oxidant. To examine the effects of temperature, experiments were made at given temperatures within limits of 20 35 C. With an increase of temperature, a photochemical reaction occurred in a shorter time. At 35 C, the reaction was approximately twice as fast as that occurring at 20 C.

16096 APTIC NO. 33533

Ziskin, M., V. Kondrat yev, and T. Sushkevich

CONCERNING THE PHOTOCHEMICAL ACTIVITY OF A QUARTZ MERCURY ARC IN THE CASE OF THE REACTIONS OF CO + O2 AND CO + NO. *(K voprosu o fotokhimicheskoy aktivnosti kvartsevoy rtutnoy dugi v sluchaye reaktsiy CO + O2 i CO + NO). Zh. Fiz. Khim., 8(2):281-289, 1936. 8 refs. Translated from Russian. Joint Publications Research Service, Washington, D. C., 15p., Oct. 24, 1960.*

NTIS: 60-41,587

Comparative studies were carried out on the rates of the photochemical carbon monoxide + oxygen and carbon monoxide + nitric oxide reactions in a special device in which various gases could be introduced between the mercury arc and the reaction vessel. In the case of the CO + O2 reaction, the introduction of CO markedly retards the reaction, while there is no noticeable effect due to the introduction of CO2. The excited CO molecules are the primary active centers in the observed reaction. Introduction of CO + NO into the space between the arc and the reaction vessel retards the CO reaction to an appreciably smaller extent; hence, the active centers are the excited CO molecules, the excited NO molecules, as well as the O atoms originating as a result of induced predissociation of NO molecules. Introduction of O2 and N2 leads to a noticeable acceleration of the CO + NO reaction which is due to the rise in the temperature of the reaction zone. Results obtained in the study of the rates of the photochemical reactions are corroborated by results of experiments with NO and O2 fluorescence. In the spectrum of NO fluorescence induced by a mercury arc, there are two species of NO gamma bands which attest to the appearance of excited molecules in the reaction zone. A study of the dependence of the intensity of the O2 resonance fluorescence spectrum on oxygen pressure confirms the interpretation of this spectrum as a diffusion spectrum, which means that the intense 1849 A mercury line is not photochemically active in the CO + O2 reaction. (Author summary modified)

EFFECTS-HUMAN HEALTH

16097 APTIC NO. 33376

Ministry of Health and Welfare (Japan), Public Nuisance Section

OPINION OF THE MINISTRY OF HEALTH AND WELFARE AND THE COUNTERMEASURE TO THE ENVIRONMENTAL HAZARD BY CADMIUM AT THE DISTRICT AROUND MIKKAICHI REFINERY IN KUROBE CITY, TOYAMA PREFECTURE. *(Toyama-ken Kurobe-shi Mikkaichi seirenjo shuhen ni okeru kadomiumu kankyo osen ni kansuru koseisho no kenkai to kongo no taisaku). Text in Japanese. 7p., May 1970.*

A field survey in the vicinity of the Mikkaichi refinery in Kurobe, Japan, revealed cadmium concentrations of 0.31 mg/cu m. About 400 m southwest of the refinery, 2.82 mg/100 sq cm/day of sulfur trioxide concentrations were found. Cadmium concentrations were also reported in paddy fields, in rice, and in water for drinking. A medical evaluation was made of people from the district around the refinery and a control area; except for difficulty in swallowing, moderate fever, and dental diseases, subjective symptoms were significantly higher in the refinery district. However, no one required a detailed x-ray chest examination. The maximum concentration of cadmium in the urine was 13.0 micrograms/l and the minimum was 3.7 micrograms/l. Dust discharged from the refining of zinc ores and a sintering process were thought to be the main cause of the cadmium.

16098 APTIC NO. 33443

Honeywell Corporate Research Center, Hopkins, Minn.

ODOR SENSING CELL ULTRASTRUCTURE BY ELECTRON MICROSCOPY. *Air Force Office of Scientific Research Contract F44620-68-C-0006, POO2, TR-71-0712, 103p., Dec. 1970. 69 refs.*

NTIS, DDC: AD 720893

The differential actions of octanol and ascorbic acid on the adenosine triphosphatase enzymes found in various subcellular particle fractions from olfactory tissue homogenates were investigated. Glucose oxidase was successfully immobilized in a column of acrylamide gel, and the amount of glucose in a sample was determined by passing the sample through the column and measuring the oxygen concentration. Cytological investigations on rabbit olfactory cells are reported. The regeneration of the olfactory epithelium is discussed, as well as the phenomenon of centriole migration during regeneration and normal cell development. Radioisotopes were used to trace odorants in olfactory tissue.

16099 APTIC NO. 33460

National Academy of Sciences-National Research Council, Washington, D. C., Committee on Toxicology

GUIDES FOR SHORT-TERM EXPOSURES OF THE PUBLIC TO AIR POLLUTANTS. I. GUIDES FOR OXIDES OF NITROGEN. *Air Pollution Control Office Contract CPA 70-57, 30p., April 1, 1971. 79 refs.*

NTIS: PB 199903

The nitrogen oxides of possible concern for air pollution purposes are nitric oxide (NO), nitrogen dioxide (NO2), and nitrogen pentoxide (N2O5). Nitric oxide is of little concern as air pollutant, since it is not an irritant gas. Nitrogen dioxide as a freely diffusible gas has the potential of causing adverse effects on human health and well-being. The five most important factors affecting human response to NO2 are temperature, predisposing disease, heredity, age, and interactions with other environmental pollutants. Nitrogen dioxide can produce pulmonary edema or lead to bronchiolitis fibrosa obliterans after exposures at high concentrations for a few minutes. At levels of 10 ppm or more, the acute effects of NO2 are additive with the effects of ozone. Lipoperoxidation was observed in rats exposed to NO2 at one ppm for four hours. Alterations in mas-cell morphology were observed in rat lung tissue after exposure to one ppm for one hour or 0.5 ppm for four hours. These alterations were reversible within 24-27 hours. Chronic exposure by experimental animals to NO2 at a concentration of 0.5 ppm followed by a pulmonary challenge with high levels of infectious organisms resulted in increased mortality. The effects of NO2 are, within limits, reversible. The extent of recovery seems to be a function of the degree of exposure, the length of the interval between exposures, and the health or age of the exposed individual. Short Term Public Limits were 10 min for one ppm, 30 and 60 min for one ppm, and 0.5 ppm for five hr/day, three to four days/mo. Public Emergency Limits set were five ppm for 10 min, three ppm for 30 min, and two ppm for 60 min. Three appendices were also presented. Included were exposure of experimental animals to NO2 and effects of humans exposed to NO2 and other chemical contaminants.

16100 APTIC NO. 33759

CHRONIC RESPIRATORY DISEASE AMONG NONSMOKERS IN HAGERSTOWN, MARYLAND. III. SOCIAL CLASS AND CHRONIC RESPIRATORY DISEASE. *Environ. Res., 4(3):213:232, Aug. 1971. 51 refs.*

A population of 410 white male nonsmokers, aged 35-64, in the Hagerstown, Maryland, area was studied for the relationships of chronic respiratory symptoms and pulmonary function to social class. Only dyspnea (grade two +) varied in prevalence with social class, being less common among white-collar workers whose fathers were also white-collar workers. This is consistent with the hypothesis that dyspnea grade two is primarily a cardiovascular symptom. Pulmonary function was positively correlated with social class. The effect was of the order of plus or minus 0.21 liter for the FEV 1.0 and plus or minus 22 liter/min for the PEFR. Upward social mobility had no effect on the pulmonary function values. (Author abstract modified)

16101 APTIC NO. 33882

CO AND CARDIAC DISEASE. *Roche Med. Image Commentary, 12(5):6-8, May 1970.*

Carbon monoxide is incriminated as perhaps the most deleterious toxic agent in heavy smokers and urban drivers, on the basis of experimental and clinical evidence. Anatomic observations demonstrate an atherogenic effect in coronary arteries and degenerative heart changes. Physiologic observations indicate that inhalation of CO and the resultant CO hemoglobin reaction may sufficiently interfere with oxygen transport to cause serious cardiovascular dysfunction. The relative contribution of the numerous possible sources of CO exposure to body carboxyhemoglobin levels is being carefully assessed. Preliminary information indicates that continuous exposure to comparatively low levels in the ambient air may cause significant increases, but more conclusive data are needed. To determine myocardial metabolic effects of CO inhalation, the measurement of lactate and pyruvate fluxes was used to indicate the balance between oxygen demand and oxygen availability. Patients with coronary heart disease may be particularly vulnerable to CO exposures leading to carboxyhemoglobin levels above 5%, which commonly occur in smokers and less commonly from urban air pollution. In another study, smoking habits were related to blood carboxyhemoglobin and serum cholesterol levels.

16102 APTIC NO. 33948

Staszewski, Jerzy

LUNG CANCER MORTALITY INCREASE IN POLAND. *(Wzrost unieralnosci z powodu raka pluc w polsce). Text in Polish. Nowotwory (Warsaw), 19(4):263-267, 1969. 6 refs.*

From 1959 to 1967, lung cancer mortality in Poland increased 116% in males and 48% in females. The increase was higher in urban areas than rural areas. Lung cancer is now the leading cause of death in urban Poland and second only to stomach cancer in rural Poland. Data on lung cancer mortalities prior to 1959 are not available, since no distinction was made, prior to this date, between lung cancer and malignancies occurring in the pleura. Victims over 65 are compared with those under 65, and deaths in the period 1966-1967 are compared with those of 1959-1960 for the five largest metropolitan areas of Poland and for each of the Polish provinces. Next to the five metropolitan areas, the highest absolute mortality rate for the latter period was recorded in Szczeczin Province (28 per 100,000 males) and the lowest in Rzeszow (10 per 100,000). The lowest relative increase was recorded for the five metropolitan areas (50%). Of the provinces, the lowest increase was recorded in Koszalin (61%) and the highest in Bialystok (306%). The rate of increase in lung cancer was more than 20% lower than the increase in stomach cancer in 1967.

16103 APTIC NO. 34048

Osaka Municipal Office (Japan), Dept of Hygiene

EFFECT OF AIR POLLUTION IN OSAKA CITY ON PULMONARY FUNCTION OF SCHOOL CHILDREN. *(Osakashinai taiki osen no gakudo no hai kino ni oyobosu eikyo). In: An Investigation on the Effect of Air Pollution to Human Bodies. (Part 1). Text in Japanese. p. 69-108, March 1970. 3 refs.*

Pulmonary function of elementary school children at industrial, commercial, and residential districts in Osaka City was examined with peak flow rate (PFR) and vital capacity as an index. The PFR ordinarily increases with the body growth but a decrease of PFR was observed during cold seasons (October March) among school children of the industrial district with an annual sulfur dioxide concentration of over 2.0 mg SO3/day 100 sq cm. Those who had obstructive depression in pulmonary function experienced further depression in cold seasons when SO2 and floating dust became higher in concentration. The PFR/H (H equals height x 100) was in a negative relation with SO2 at the measuring time and as positively correlated to temperature. Sulfur dioxide and temperature showed a negative relation. Thus, PFR/H was affected by the increase of SO2 concentration and the decrease of temperature in cold seasons. When the industrial district with over 0.5 ppm annual SO2 concentration was compared with the commercial district of under 0.5 ppm, obstructive depression of pulmonary function appeared in the industrial district, and it was seen only in cold seasons in the commercial area. The industrial area had a low value even in vital capacity both in cold and warm seasons. The PFR might be classified into SO2 sensitive and temperature sensitive types. The SO2 sensitive type was undoubtedly affected by air pollution. Pulmonary function in the industrial district of Osaka City decreased in winter seasons, which showed the tendency of the chronic state.

16104 APTIC NO. 34050

Osaka Municipal Office, (Japan), Dept. of Hygiene

LONG-TERM INVESTIGATION ON THE EFFECT OF AIR POLLUTION TO PULMONARY FUNCTION OF SCHOOL CHILDREN. *(Taiki osen no gakudo hai kanki kino ni oyobosu eikyo ni kansuru choki kansatsu). In: An Investigation on the Effect of Air Pollution to Human Bodies. (Part 1). Text in Japanese. p. 109 - 130, March 1970.*

Pulmonary function of children in six elementary schools in Osaka and Sakai Cities was studied for four years. The concentration of sulfur oxides was high during the winter season and had a tendency to increase each year. Dust fall was high in spring and had a tendency to decrease. Peak flow rate anf forced vital capacity were measured as indices of pulmonary function. Peak flow rate was expressed by the corrected value (PFR) which was obtained from dividing the value of the peak flowmeter of Wright by body height. No correlation was observed between PFR and concentration value of sulfur trioxide (measuring sulfur dioxide) under different years and schools. Negative correlation to PFR and concentration of SO3 was found in boys and in all seasons, however, individual differences seemed to be more significant than the general trend among girls. The PFR and dust fall also showed negative correlation. No relation was found between forced vital capacity and air pollution. Decrease of PFR value was recognized within two to three months among children after they were admitted to the investigated schools from schools in the non-polluted area. Though the relation between air pollution and PFR was observed, no quantitative relation was found.

16105 APTIC NO. 34128

Amdur, Mary O.

EFFECT OF A COMBINATION OF SO2 AND H2SO4 ON GUINEA PIGS. *Public Health Rept. (U. S.), 69(5):503-506, May 1954. 8 refs. (Presented at the American Association for the Advancement of Science Meeting, Boston, Mass., Dec. 29, 1953.)*

The effects of sulfur dioxide and sulfuric acid on the lungs and the respiratory system were studied. Guinea pigs were exposed for eight hours to a combination of eight mg/cu m of sulfuric acid mist and 89 ppm of SO2. Two of the animals were re-exposed after four days for another eight hours. A control group of four guinea pigs were exposed exclusively to 89 ppm of SO2. The effect of a combination of H2SO4 and SO2 on the growth curves was definitely greater. The animals that were re-exposed to the combination ceased to grow. Lung damage was also extensive. Sulfuric acid mist and SO2 combined caused great respiratory distress apparent within the first hour of exposure and increasing as exposure continued. Dyspnea was pronounced, and the labored breathing continued for 24-48 hours after the animals were removed from the exposure chamber.

16106 APTIC NO. 34130

Ayres, Stephen M., Stanley Giannelli, Jr., and Hiltrud Mueller

CARBOXYHEMOGLOBIN AND THE ACCESS TO OXYGEN: AN EXAMPLE OF HUMAN COUNTEREVOLUTION. *Preprint, American Medical Association, Chicago, Ill., 12p., 1970. 26 refs. (Presented at the Air Pollution Medical Research Conference, New Orleans, La., Oct. 7, 1970.)*

Studies on carboxyhemoglobin and its relation to the access to oxygen are reviewed. The respiratory characteristics of hemoglobin and carboxyhemoglobin and oxygen dissociation curves are examined. The access to oxygen and rate of tissue respiration were correlated with the possibility of carbon monoxide interference with the function of iron-containing respiratory pigments. The frequency of carboxyhemoglobinemia in relation to air pollution during atmospheric inversions and smoking, adaptations to hypoxia, and the significance of adaptive mechanisms are examined. The systematic hemodynamic and myocardial responses to concentrations of carboxyhemoglobin are discussed based on inhalation experiments with CO. Carboxyhemoglobin and the balance between myocardial oxygen demand and availability were correlated.

16107 APTIC NO. 33714

Bab, H., P. -J. Grosser, and K. Horn

STUDIES ON AIR POLLUTION AND BONE GROWTH OF SCHOOL CHILDREN IN THE GERMAN DEMOCRATIC REPUBLIC. *(Untersuchungen ueber Luft-verunreinigung und Knochenwachstum bei Schulkindern in der DDR). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 17(9):643-644, Sept. 1971. 3 refs.*

Two groups of children, one from an industrialized area with heavy air pollution and one from a non-polluted district in East Berlin were used for a study of the connection between air pollution and bone growth. In the polluted area, sulfur dioxide, respirable dust, and sedimenting dust was found in the atmosphere. Of 321 children s radiographs of the left hand primarily of the os metacarpal, os capitatum, os hamatum, os naviculare, os lunatum, and os triquetrum were taken. The individually measured values were correlated with the body weight and height. In agreement with other studies, ossification of the examined bones was retarded in those children growing up in the heavily polluted industrial area. days to cover the investment costs. Thereafter the system operates with profit.

16108 APTIC NO. 34201

Banyai, Andrew L.

OMINOUS MESALLIANCE: INHALATION OF CARBON MONOXIDE FROM MOTOR VEHICLES AND CIGARETTES. *Chest, 58(5):532, Nov. 1970. 1 ref.*

The effects of inhaling carbon monoxide from motor vehicles and cigarettes are described. High atmospheric temperature and humidity aid rapid uptake of CO by hemoglobin. In patients with emphysema, CO absorption is reduced because not all the tidal air is reaching the pulmonary capillaries. In humans suffering from coronary heart disease, the extraction of oxygen from the blood by the myocardium is reduced at carboxyhemoglobin levels 5-12%. This phenomenon may be a contributory factor to the increased incidence of angina pectoris and coronary thrombosis in the individuals involved. CO also increases viscosity of the blood. Rabbits inhaling 0.017% CO in air for several weeks develop atherosclerosis and myocardial necrosis. Observations in humans show that low concentrations of CO may lead to inhibition of bioelectric activity of the brain. In the lung, hypoxia caused by CO inhibits the function of alveolar macrophages, weakening tissue defense against airborne bacterial infection.

16109 APTIC NO. 33758

Barach, Alvan L.

THE AMBIENT AIR, THE GOOD OF IT AND THE BAD OF IT: THE DEVELOPMENT OF THERAPEUTIC GASES AND AIR POLLUTION. *J. Am. Geriat. Soc., 14(10):817-832, Oct. 1971. 43 refs. (Presented at the American Geriatrics Society, Annual Meeting, 28th, Chicago, Ill., April 23, 1971.)*

Artificial gases that menace human health have been added to the atmosphere as a consequence of industrial development and increased population density. In persons over 65 or 45-55 with respiratory and cardiac diseases, air pollutants can cause exacerbation of symptoms and even death. However, the adverse effects occur only during acute episodes, not at the low levels generally present in urban communities. Authorities and doctors must provide definite information for therapy when an acute air-pollution emergency arises. Alkaline sprays are available for neutralizing sulfur dioxide, which plays the major role in urban pollution. To prevent formation of sulfuric acid in homes and hospitals, humidifiers containing plain water should not be used if there is real danger of SO2 pollution. Other pollutants discussed are ozone, nitrogen dioxide, carbon monoxide, and freon.

16110 APTIC NO. 33423

Bates, David V., Birney R. Fish, Theodore F. Hatch, Thomas T. Mercer, and Paul E. Morrow

DEPOSITION AND RETENTION MODELS FOR INTERNAL DOSIMETRY OF THE HUMAN RESPIRATORY TRACT. *Health Phys., vol. 12:173-207, 1966. 254 refs.*

A Task Group was created to review the so-called lung model, a scheme for computing dust deposition in and clearance from the human respiratory tract. The purpose of the study was to provide a basis for lung dosimetry and the setting of exposure limits. A dust deposition model was developed which utilizes and depends on dust sampling data. A model describes the deposited dust in terms of three anatomical compartments, nasopharynx, tracheal-bronchial tree, and pulmonary, which have important functional distinctions and radiobiologic implications. It considers, among other things, expected variations in minute ventilation associated with different work states. It will require periodic minor adjustments, but should provide a basis for more efficient and direct hazard evaluation. A dust clearance model is proposed in which the dust in each respiratory compartment is dealt with quantitatively, kinetically, and by pathways. The special problems of the radon and its decay products are reviewed, including recent experimental data revealing the rapid clearance characteristics of the radon daughters. The suitability of the proposed models and the free ion controversy are also discussed. Normal respiratory values were calculated on anatomical and physiological bases. Human measurements were emphasized and representative values for the more important parameters are given for children and adults. Future problems include the creation of an improved classification of chemical substances and information of the differences in retention between single and multiple dust exposures. More detailed and quantitative clearance data are needed to fortify or modify existing clearance concepts.

16111 APTIC NO. 33504

Battigelli, M. C.

MERCURY TOXICITY FROM INDUSTRIAL EXPOSURE. A CRITICAL REVIEW OF THE LITERATURE - PART I. *J. Occupational Med., vol. 2:337-344, July 1960. 67 refs.*

Data from animal experiments and observations of human cases are analyzed in relation to the variables of intake and subsequent handling by the body of mercury in different forms. Industrial exposures include the mining and refining of ore containing cinnabar (mercurous sulfide); the manufacture of felt hats, technical instruments, carbon brushes for electrical equipment, and certain fluorescent lamps; and the use of mercury paints. The degree of intoxication produced by mercury is determined by the amount and rate of absorption, physiochemical properties of the absorbed compound, and individual susceptibility. Neither the amount of mercury that constitutes a harmful total body burden nor the amount that is safely tolerated is known with satisfactory precision for humans. The metabolism of mercury in the blood, brain, kidney, liver, and intestine is discussed. It is known that mercury develops chemical associations with various substances in the blood. There is a poor correlation between the amount of mercury localized in a given tissue and pathological changes. The matter is further complicated by the fact that mercury may be found in impressive concentrations in the tissues of persons with no identifiable intake of this substance. The diuretic effect of mercurials stems from their inhibition of succinic dehydrogenase within kidney cells. The ultimate effect of mercury and its compounds is very probably based on the capacity of these substances to inhibit enzymes.

16112 APTIC NO. 33957

Battigelli, M. C., D. A. Fraser, and H. M. Cole

EXPERIMENTAL STUDIES ON SULFUR DIOXIDE TOXICITY. *Preprint, American Medical Association, Chicago, Ill., 24p., 1970. 22 refs. (Presented at the Air Pollution Medical Research Conference, New Orleans, La., Oct. 5-7, 1970.)*

Groups of albino rats were exposed to ambient air, graphite dust (1 mg/cu m), and sulfur dioxide (3 ppm) with graphite dust (1 mg/cu m); groups of hamsters were exposed to ambient air, calcium sulfate dust (1 mg/cu m), graphite dust (1 mg/cu m), sulfate dust and sulfur dioxide (3 ppm), and graphite dust (1 mg/cu m) and SO2 (3 ppm). The sequence of exposure involved a daily schedule of 12 hours, 7 days a week, for up to 112 consecutive days. The ciliary activity of the tracheal mucosa of the animals was not affected. The frequency of isolation of bacterial genera from peripheral lungs up to and including lobar bronchi appeared to be depressed in hamsters exposed to the dust alone or to dust in conjunction with SO2. Rats and hamsters responded consistently to the mixture of SO2 and dust, with comparable reduction in the frequency of bacterial isolates.

16113 APTIC NO. 34059

Bazell, Robert J.

LEAD POISONING: COMBATING THE THREAT FROM THE AIR. *Science, 174(4009):574-576, Nov. 5, 1971.*

Passed in August 1970 by the city council, New York s antilead ordinance requires a stepwise reduction to two grams of lead per gallon of premium gasoline and 1.5 per gallon of regular this month (Nov. 1971), and to no lead in any gasoline by January 1, 1974. The Environmental Protection Agency will publish some lead control regulations by the middle of December 1971, with 30 or more additional days allowed for comments. At the very least, the federal rules will require that lead-free or low-lead gasoline be available for 1975 model cars, which will be fitted with lead-sensitive catalytic mufflers to control polluting emissions. Lead poisoning, orginally an occupational disease, has also become a disease of urban slum children, who eat the paint crumbling off the walls of dilapidated housing. As measuring devices ary put closer to traffic, lead levels rise. The concentration of lead in the air is actually increasing in several locations.

16114 APTIC NO. 34291

Behnke, Roy H., S. Gilbert Blount, J. David Bristow, Virginia Carrieri, John A. Pierce, Arthur Sasahara, Alfred Soffer, and Richard Greenspan

PRIMARY PREVENTION OF PULMONARY HEART DISEASE. *J. Am. Osteopath. Assoc., 69(11):1139-1146, July 1970.*

Effective programs of prevention of pulmonary heart disease are facilitated by an accurate assessment of the scope and magnitude of the health problem. Chronic obstructive lung disease (bronchitis and/or emphysema) is by far the most important of the respiratory diseases associated with pulmonary heart disease. The incidence and prevalence of chronic obstructive lung disease and cor pulmonale are indicated, including mortality statistics. The basic risk factors leading to chronic respiratory disease are cigarette smoking, infection, and air pollution. Occupational exposure to toxic substances and general pollution of the atmosphere are considered. Causes and the pathogenesis of cor pulmonale are discussed. Recommendations are made for intensified research and criteria for the diagnoses of cor pulmonale and right heart failure.

16115 APTIC NO. 33526

Berndt, H.

THE EPIDEMIOLOGY OF LUNG CANCER. *(Zur Epidemiologie des Lungenkrebses). Text in German. Arch. Geschwulstforsch., 28(1):28-42, 1966. 31 refs.*

Morbidity and mortality from lung cancer are shown to increase with increasing consumption of cigarettes, urbanization, the general air pollution, and certain occupational hazards. Lung cancer is often accompanied by nonspecific, chronic diseases of the respiratory tract and by peptic ulcer. A carcinoma of the bladder frequently occurs as a second primary tumor. Climatic conditions and adverse social circumstances are conducive to the development of lung cancer. The frequent aggregation within a family, the relation to maternal age at birth, and the varying distribution of the months of birth in lung cancer patients suggest that prenatal and perinatal damages are involved; the nature of these damages is not clear.

16116 APTIC NO. 34077

Bouhuys, Arend

BYSSINOSIS: AIRWAY RESPONSES CAUSED BY INHALATION OF TEXTILE DUSTS. *Preprint, American Medical Association, Chicago, Ill., 4p., 1970. 10 refs. (Presented at the Air Pollution Medical Research Conference, New Orleans, La., Oct. 5-7, 1970.)*

In recent years it has been shown that byssinosis is highly prevalent among cotton textile workers in the United States. Airway responses which occur within a few hours of inhalation of textile dusts are discussed. When small inhaled textile dust particles settle in small airways, the histamine-releasing agents in the dust can penetrate the airway mucosa and release histamine, principally from mast cells. The released histamine contracts airway smooth muscle and this results in various pulmonary function changes associated with constriction of small airways. Textile dust exposure affects some persons more than others. Studies of hemp workers are described that have demonstrated that alteration of the balance between vagal and sympathetic stimuli which impinge on airway smooth muscle can markedly alter an individual s sensitivity to hemp dust exposure. A drug which blocks B-adrenergic receptors (propranolel) displaces the vagal-sympathetic balance in the direction of vagal preponderance and in this condition small airway constriction during hemp dust exposure is potentiated. Conversely, atropine leads to sympathetic preponderance and protects the small airways from being narrowed by hemp dust.

16117 APTIC NO. 34197

Bouhuys, Arend

MAXIMUM EXPIRATORY FLOW-VOLUME CURVES IN CHILDREN AND ADOLESCENTS. *Bull. Physio-Pathol. Respir. (Nancy), vol. 7:113-123, 1971. 12 refs.*

Recent studies providing information, obtained mainly by body plethysmography, on the relations between lung size, maximum flow rates, and airway conductance between growth from childhood to adolescence are reviewed. Over the age range 6 to 18 years, maximum expiratory flow rates on MEFV curves and airway conductance increase in proportion to total lung capacity. This suggests that the lungs and airways grow isotropically. The relationships between a measure of lung size and maximum expiratory flow rates may be useful for the assessment of changes of pulmonary function in children during their growth period. In studies of children with bronchial asthma or cystic fibrosis and of adolescents who regularly smoke cigarettes, flow rates on MEFV curves, measured at relatively small lung volumes, proved to be sensitive indices of the degree of function impairment. These flow rates were often abnormally low when conventional indices were within normal limits. It is believed that MEFV curves provide a sensitive method of assessing the degree of small airway obstruction in persons with lung disease, even when the lesions are subclinical. (Author abstract modified)

16118 APTIC NO. 34222

Brain, Joseph D.

FREE CELLS IN THE LUNGS. SOME ASPECTS OF THEIR ROLE, QUANTITATION, AND REGULATION. *Arch. Internal Med., 126(3):477-487, Sept. 1970. 73 refs. (Presented at the Workshop on Pulmonary Responses to Inhaled Materials: An Evaluation of Model Systems, Castle Harbour, Bermuda, Oct. 24, 1969.)*

Free cells in the lungs, primarily alveolar macrophages, are apparently derived from both pulmonary and hematopoietic tissues. These cells ingest particles and microorganisms which have deposited on the alveolar surface. Increased deposition of inert or infectious particles may act to recruit additional macrophages. Most free cells containing deposited particles reach the ciliated region of the lungs and are eliminated into the pharynx and swallowed. The yield of cells recovered by multiple lavage of the lung can be sued to estimate the numbers of free cells in the lungs. If respiratory tract fluid is collected from the trachea, the numbers of free cells excreted from the lungs via the airways can be measured. Better methods for examining the input of free cells and other output pathways need to be developed. Review of the literature reveals that a thorough discussion of pulmonary free cells and their responses to inhaled materials is lacking. Included in a discussion for each aerosol exposure should be a description of the exposure conditions (including aerosol size distribution, aerosol concentration, elemental composition, and exposure duration), a description of the morphological, biochemical, and functional characteristics of the lung free cells, a measurement of the input and output of the pool of free cells, a knowledge of how the quantitative and qualitative factors describing the pool of free cells change with various physiological and pathological states, and an understanding of how such changes are mediated.

16119 APTIC NO. 33880

Cassell, Eric J.

AIR POLLUTION -- THE RELATIONSHIP BETWEEN HEALTH EFFECTS AND CONTROL PHILOSOPHY. *IEEE (Inst. Elec. Electron. Engrs.) Trans. Geosci. Electron., 7(4):220-226, Oct. 1969. (Presented at the Institute of Electrical and Electronic Engineers, International Geoscience Electronics Symposium, Washington, D. C., April 1969.)*

The evidence concerning the health effects of air pollution is briefly reviewed. In addition, new data from the Cornell Family Illness Study are used to draw a picture of the complex interactions between man and his environment. The population studied was a panel of 1747 persons, representing a reasonable cross section of New York City residents and living in one-half square mile of generally homogeneous air pollution. A daily record of the appearance of each of twenty-one symptoms of disease and other health information was obtained by weekly interviews. Air pollutants were measured in the study area by the project laboratory, and meteorological measurements were available from the study station and from the city. Results indicate that air pollution has definite but varying adverse effects upon health. No single pollutant appears solely responsible for the effects; rather, they seem to come from the totality of the atmospheric environment with weather and season playing their part and are influenced by variations in individual habits as well as by certain social determinants. A control philosophy based upon process control is described suggesting the control of emissions to the greatest extent feasible, employing the maximum technological capability. A parallel is drawn between the public health advances necessary in the past to allow the growth of the cities and the need for pollution control to allow the continued growth of technology. (Author abstract modified)

16120 APTIC NO. 34109

Cohen, Charles A., Arnold R. Hudson, Jack L. Clausen, and John H. Knelson

RESPIRATORY SYMPTOMS, SPIROMETRY, AND OXIDANT AIR POLLUTION IN NONSMOKING ADULTS. *Preprint, North Carolina Univ., Chapel Hill, Bio-Medical Research Branch, 34p., 1971 (?). 34 refs.*

A comparison of respiratory symptoms and selected pulmonary function tests between two similar groups of nonsmoking adults chronically exposed to essentially the same mean levels, but different peak levels of oxidant air pollution in San Diego did not show a difference in the prevalence of symptoms suggestive of pulmonary disease. Analysis of the different ventilatory parameters measured from spirometry and maximal expiratory flow-volume curves also did not indicate significant differences between the two groups. Socio-economic factors, meteorologic conditions, and other factors were included.

16121 APTIC NO. 34043

Conradi, Carmen, Peter H. Burri, Yusuf Kapanci, Farrel R. Robinson, and Ewald R. Weibel

LUNG CHANGES AFTER BERYLLIUM INHALATION. *Arch. Environ. Health, 23(5):348-358, Nov. 1971. 18 refs.*

Monkeys and dogs exposed to an environment contaminated with beryllium oxide calcinated at 1400 C were examined for effects of beryllium inhalation. Two years after exposure, lung tissue was investigated by electron microscopy. In both experimental and control animals, unidentified particles were determined inside lysosomes occurring in histiocytes, endothelium, and macrophages. No neoplastic or granulomatous pulmonary lesions were observed in the beryllium-exposed animals. The mean thickness of the air-blood barrier was not changed. Both control and test dogs had vacuolated interstitial cells, interpreted as degranulated mast cells. The beryllium compound caused no pathological lung tissue alterations although it was still deposited in the lung two years after exposure. (Author abstract modified)

16122 APTIC NO. 33498

Coscia, G. C., G. Perrelli, F. Capellaro, and P. C. Gaido

SOME DATA ON ENZYMATIC PROCESSES IN ERYTHROCYTES IN CASES OF OCCUPATIONAL CO POISONING. *(Alcuni aspetti del quadro enzimatico eritrocitario nell ossicarbonismo professionale). Text in Italian. Med Lavoro (Milan), 54(10):676-679, 1963. 15 refs.*

The determinations were carried out on the erythrocytes of 19 subjects employed in the industrial production of coal gas. No statistically significant differences were noted between the values obtained and those found in a group of normal subjects; nevertheless a certain number of cases with carboxyhemoglobin values well above normal, showed a lowering of metabolic activity. This suggests a possible effect, even if limited, of carbon monoxide on the erythrocytic enzymatic systems. (Author summary modified)

16123 APTIC NO. 34198

Dalhamn, Tore

CILIARY MOTILITY STUDIES. *Arch. Internal Med., 126(3):424-427, Sept. 1970. 15 refs. (Presented at the Workshop on Pulmonary Responses to Inhaled Materials: An Evaluation of Model Systems, Castle Harbour, Bermuda, Oct. 23, 1969.)*

Different methods of studying ciliary motility in the trachea and toxic inhalation effects are considered. Comparable effects on human beings are the primary concern, it is doubtful whether results from lower species (mussels, oysters) can be directly applied to vertebrates. Few reports in which in vivo or in vitro experiments can be compared are published, however, there are some preliminary indications that very similar results are obtained under both exposure conditions with the same species. Observation techniques are all very similar, employing a microscope with vertical light. For recording flicker activity, three methods are available: filming, stroboscopy, or photoelectric cell. At present, for in vivo preparation, filming is superior. (Author abstract modified)

16124 APTIC NO. 33850

Debelic, M.

EXOGENEOUS ALLERGY AT ASTHMA BRONCHIALE AND ASTHMATOID BRONCHITIS. *(Exogene Allergie bei Asthma bronchiale und asthmoider Bronchitis). Text in German. Med. Welt (Stuttgart), 22(39):1516-1521, 1971. (Presented at the Nordwestdeutsche Gesellschaft fuer Innere Medizin, Helgoland, West Germany, June 1968.)*

Patients with symptoms of asthmatic dyspnoe were examined for exogeneous allergy. Cutaneous test methods showed 71.5% of all patients were sensitive to exogeneous allergens. The most frequent antigen was home dust (38.8%), followed by grass (23.6%), rye (22.5%) and pollen from bushes (21.2%). Of 325 inhalation tests with allergens, 167 (51.4%) were positive and 158 (48.6%) negative. Based on the skin and bronchial tests as well as other criteria (anamnesis, provocatory testing, and clinical, chemical, and zytological examinations) a final decision on the actual exogeneous, allergic pathogenicity was made. Exogenous allergy was of relevant at 40.9% cent of the 834 patients of which 6.4% were pure allergies and 34.5% a combination of exogeneous allergy plus infection. Infection was the primary cause and no allergy was detectable for 59.1% of the cases.

16125 APTIC NO. 33951

Dennis, M. W., J. S. Douglas, J. U. Casby, J. A. J. Stolwijk, and A. Bouhuys

ON-LINE ANALOG COMPUTER FOR DYNAMIC LUNG COMPLIANCE AND PULMONARY RESISTANCE. *J. Appl. Physiol., 26(2):248-252, Feb. 1969. 8 refs.*

An analog computer for the on-line instantaneous computation of dynamic lung compliance and pulmonary resistance from plueral (or esophageal) pressure, flow rate, and tidal volume is described. The functional theory and circuitry design are given. This device proved useful for the breath-by-breath assessment of the normal variability of compliance and resistance in spontaneously breathing guinea pigs and of effects of bronchoconstrictor drugs and air pollutants. Since the computer has a wide frequency range (10-400 cycles/min), it can be used in many experimental animals as well as man without electronic modification. (Author abstract modified)

16126 APTIC NO. 33820

Dix, William B.

ALUMINUM POWDER AND SILICOSIS PREVENTION. *Can Mining J., 92(10):35-42, Oct. 1971.*

Throughout the 27 year period between 1943 and 1970, the McIntyre Research Foundation aluminum powder has been used as a preventive measure against silicosis in the Ontario gold mining industry. Miners have received 42,000,000 preventive treatments in dust exposure occupations. All miners given aluminum prophylaxis have been medically examined each year. Inhalation of aluminum has revealed no ill effects, and to the Foundation s knowledge not a single case has been found in which aluminum powder, as administered as a prophylactic measure against silicosis, has caused any lung damage. Aluminum, however, is not a substitute for sound dust and medical control. Medical research, animal research, human studies, and clinical trials pertaining to silicosis and aluminum prophylactic treatment are discussed. (Author summary modified)

16127 APTIC NO. 33750

Doerre, W. H.

ESTABLISHING HYGIENE STANDARDS FOR POLLUTANTS OF THE ENVIRONMENT. *(Zur Ausarbeitung hygienischer Normative fuer Schadstoffe in der Umwelt). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 17(9):665-666, Sept. 1971.*

In establishing standards for pollutants in the environment, the change-over of pollutants from one aspect of the environment to another must be considered. For example, pollutants emitted into the atmosphere can reach the soil or water by fallout or washout. Pollutants will never be present in isolated form but always in combination. The pollutant concentration in the environment is subject to temporal fluctuations. For certain air pollutants, marked diurnal and seasonal rhythms exist. Not the entire pollutant concentration will have its effect. If, for example, 1 cu m air is inhaled containing particles of a pollutant at a concentration of 1 mg/cu m, only a fraction of that pollutant concentration will affect the person; particle size, solubility, and other factors will play a role. The first contact of the pollutants with man is via the skin and mucous tissue. The pollutant either remains there and is decomposed or discharged again, or it penetrates into the organism.

16128 APTIC NO. 33480

Eisenbud, Merril, R. C. Wanta, Cyril Dustan, L. T. Steadman, W. B. Harris, and B. S. Wolf

NON-OCCUPATIONAL BERYLLIOSIS. *J. Ind. Hyg. Toxicol., 31(5):282-294, Sept. 1949. 5 refs. (Presented at the American Industrial Hygiene Association, Annual Meeting, Detroit, Mich., April 7, 1949.)*

The relationship between the incidence of berylliosis and levels of atmospheric contamination are reported. Eleven persons showing chronic beryllium poisoning were reported among residents in the vicinity of a beryllium producing plant. None gave a history of occupational exposure. Ten of the affected persons resided within three-quarters of a mile of the plant. The distribution of the cases with respect to the plant indicates that the incidence of disease was a function of the concentration to which the residents were exposed. The eleventh patient resided almost two miles from the plant and was a member of the household of an employee of the plant. The average concentration three-quarters of a mile from the plant was estimated to range from 0.01 to 0.1 microgram/cu m. The average daily concentration of beryllium in the vicinity of a plant producing and processing beryllium should be limited to 0.01 microgram/cu m. (Author summary modified)

16129 APTIC NO. 33739

Emik, L. Otis, Roger L. Plata, Kirby I. Campbell, and George L. Clarke

BIOLOGICAL EFFECTS OF URBAN AIR POLLUTION. *Arch. Environ. Health, 23(5):335-342, Nov. 1971. 14 refs.*

Laboratory animals were raised in rooms ventilated with ambient air or air passed through absolute particulate and activated charcoal filters to determine the biological effects of urban air pollution. Average ambient concentration of oxidants and carbon monoxide was 0.057 and 1.7 ppm, respectively, over two-and-one-half years. Pulmonary alkaline phosphatase in exposed rats and serum glutamic oxaloacetic transaminase in exposed rabbits were lower. Pneumonitis was significantly more prevelent in mice exposed to ambient air. Male mice survived longer significantly in filtered air; A/J mice survived longer and were heavier in ambient air. Old guinea pigs had identical pulmonary resistance to filtered air and equal increases due to 0.5 ppm of sulfur dioxide, but those exposed to filtered air showed significantly greater response to 0.5 ppm of ozone. Decreased running activity of male mice was highly correlated with oxidant concentration. Pulmonary tumors were found in the lungs of some mice.

16130 APTIC NO. 33332

Flury, F.

THE ROLE OF NITRIC OXIDE IN POISONING BY NITROUS GASES. *(Die Rolle des Stickstoffmonoxyds bei der Vergiftung durch nitrose Gase). Text in German. Arch. Exp. Pathol. Pharmakol., vol. 157:104-106, 1930. 4 refs.*

Four types of poisoning by nitrous gases are described. The first starts with local irritations, followed by several hours of apparent well-being, then increasing shortness of breath, cyanosis, and death within one or two days. The second type is reversible and produces shortness of breath, cyanosis, unconsciousness, and formation of methemoglobin, without pleural edema. If exposure to the poisonous atmosphere continues, death will occur rapidly; if the person is removed from this atmosphere without too much delay, complete recovery is possible within a rather short time. Type three, called shock type, starts with immediate symptoms of suffocation, cramps, and breath stoppage. Death occurs quickly; its immediate cause is probably stasis in the blood vessels of the lung. This type is rare, and occurs only during inhalation of very high concentrations. Type four, called combined type, starts with dizziness and cyanosis symptoms, followed by recovery if the person is removed from the poisonous atmosphere; however, after a few hours a relapse occurs and usually death results from pleural edema. Only rarely does the person recover. The explanation of these differences lies in the variation in the type of nitrous gases present, either individually or in mixtures. These are nitric oxide, nitrous oxide, nitrogen tetroxide, nitric acid, and nitrous acid.

16131 APTIC NO. 34036

Forni, Alessandra M., Anna Cappellini, Emma Pacifico, and Enrico C. Vigliani

CHROMOSOME CHANGES AND THEIR EVOLUTION IN SUBJECTS WITH PAST EXPOSURE TO BENZENE. *Arch. Environ. Health, 23(5):385-391, Nov. 1971. 22 refs.*

Chromosome changes in 32 subjects with known benzene poisoning were investigated. Studies of peripheral blood lymphocytes in 25 subjects recovered from benzene hemopathy, four subjects with bone marrow toxicity from benzene, and three subjects recovered from acute benzene poisoning determined significantly increased rates of unstable and stable chromosome aberrations which, in most cases, were still present several years after cessation of exposure to the toxic agent and recovery. Follow-up cytogenetic studies revealed a tendency toward a decrease in unstable chromosome changes and a persistence or increase in stable changes. In some cases an abnormal clone formed in peripheral blood lymphocytes. Chromosomes of the G group were involved in stable changes with a frequency higher than expected. (Author abstract modified)

16132 APTIC NO. 33782

Frangulyan, R. A.

THE EFFECT OF SYNTHETIC CORUNDUM DUST ON THE UPPER RESPIRATORY TRACT OF EXPERIMENTAL ANIMALS. *(O vliyanii pyli sinteticheskogo korunda na verkhniye dykhatelnyye puti eksperimentalnykh zhivotnykh). Text in Russian. Zh. Ushn. Nos. Gorl. Bol., 31(4):6-9, 1971. 5 refs.*

White rats were subjected to synthetic corundum dust by inhalation in order to investigate the mechanism of action of aluminum oxides on the tissues of the upper respiratory tract. The animals were treated in exposure chambers, containing 200 mg/cu m corundum dust, two hours daily six times per week for one, two, four, six or eight months. Histological studies of nasal and tracheal tissue samples obtained at autopsy performed at the end of each experimental period were carried out. A catarrhal condition of the nasal and tracheal mucosa developed after one or two months of treatment. Focal deterioration of the nasal epithelium and proliferation of the basal cells with the development of atypical outgrowths penetrating the connective tissue occurred after four months of treatment. Desquamation of the nasal epithelium and dystrophic changes of the tracheal cartilage occurred after six months of treatment; at this stage, the cellular constitution of the inflammatory infiltrate appeared to be very high in eosinophilic leukocytes. Erosion surfaces within the nasal and tracheal mucosa as well as necrotic alterations of the tracheal cartilage rings developed after eight months of exposure to corundum dust.

16133 APTIC NO. 33959

Frank, N. R., E. Yokoyama, S. Watanabe, D. E. Sherry, and J. D. Brain

AN OZONE JOURNAL. *Preprint, American Medical Association, Chicago, Ill., 13p., 1970. 10 refs. (Presented at the Air Pollution Medical Research Conference, New Orleans, La., Oct. 5-7, 1970.)*

In a series of investigations to determine the functional effects of ozone, dogs weighing from 14-18 kg were anesthetized with sodium pentobarbital, paralyzed with succinylcholine chloride, and mechanically ventilated through a tracheal cannula with a mixture of ambient air and oxygen. Uptake of ozone by nasal and oral passages was compared. The two rates of continuous flow were 35.0-45.0 and 3.5-6.5 liters/min; the two levels of ozone concentration were 70-80 and 26-34 pphm. Nasal uptake was higher than oral uptake at both rates of flow, and both nasal and oral uptake were inversely related to the flow rate. The rate of uptake varied inversely with concentration except when flow was directed through the mouth at the higher flow rate. In another experiment with cats, during exposure to about 1 ppm ozone, pulmonary flow resistance increased universally. The volume-pressure curve of rabbit lungs was observed to be slightly depressed after three hours of atelectasis.

16134 APTIC NO. 33429

Friedrich, Hans

GENERATION AND MEASUREMENT OF AIR IONS FOR MEDICAL APPLICATIONS AND THEIR INFLUENCE ON REACTION TIME AND MONOSYNAPTIC REFLEX OF MAN. *(Erzeugung und Messung atmosphaerischer Kleinionen fuer medizinische Untersuchungen und ihr Einfluss auf Reaktionszeit und Muskeleigenreflex des Menschen). Text in German. Elektromed. (Berlin), 12(4):125-132, July 1967.*

A new ion generator is proposed for which the effective, or inhaled, ion density can be determined. The occurrence of ion effects only with inhalation through the mouth and not with nasal inhalation, and the absence of any qualitative difference between oral and nasal inhalation are discussed. Measurement of the retention of air ions in the respiratory system showed that ions having small mobility remain in the respiratory system. In a series of experiments on the effects of air ions on the reaction time and monosynaptic reflex of man, both negative and positive ions prolonged and shortened the reaction time, possible because of the different initial autonomic tonus (IAT) of the subject. When atropine, which inhibits parasympathetic innervations, was administered to influence the IAT, positive ions shortened the reaction time while negative ones prolonged it. During experiments on the monosynaptic reflex, only negative ions were applied. On the average, the ion effect began after seven minutes of ionization and resulted in a 12% decrease of the amplitude of the reflex action potential.

16135 APTIC NO. 33664

Fujiwara, Masakazu

MEDICAL FOLLOW-UP EXAMINATION OF HEALTHY PEOPLE TO DISCOVER THE UNAWARE PATIENT. *(Mujikaku kanja no hakken o mokuteki to shita gaikenjo kenkosha no seimitsu kenshin ni yoru nenji tsuikyu chosa). Text in Japanese. In: A study of the Administration Method of Medical Care for Sufferers From Public Nuisance in Yokkaichi City. Committee of Mie Prefectural Medical Insurance on Public Nuisance (Japan), p. 1-32, March 1970.*

Healthy inhabitants of Yokkaichi City were examined for pulmonary function. The results did not differentiate between occupational classes; the average value by age and standard deviation were then determined. Vital capacity (VC), forced vital capacity (FVC), FEVIO (?), and MVV(?) deteriorated with age but did not differ for % VC, rate/sec VC, or % MVV. Few healthy persons had deteriorated pulmonary function; the few cases determined were among the aged men. Many of the examinees had abnormal respiratory resistance. Deterioration of the pulmonary function was greater in the group over 40 years old.

16136 APTIC NO. 34092

Golli, V., E. Stefanin, Brindusa Turnescu, and Rodica Stan

RESEARCH ON THE ACTUAL PREVALENCE OF CHRONIC BRONCHITIS. *(Cercetari asupra prevlantei actuale a bronsitei cronice). Text in Rumanian. Rev. Med.-Chir., vol. 73:83-869, Oct.-Dec. 1969. 26 refs.*

An epidemiological study of 2942 persons (1329 males and 1693 females) older than 15 years of age, in the city of Craiova (Rumania), revealed that 7.95% (10.98% of males and 5.39% of (females) had chronic bronchitis. The frequency of the condition increased with age (2.29% among those younger than 30 compared to 15.43% in the over 50 years old group). Smokers had 5.5 times more bronchitis than did nonsmokers (24.6% and 4.44%, respectively); among smokers, the incidence of bronchitis increased with the duration of smoking and the number of cigarettes smoked daily. Unskilled workers had more bronchitis than did skilled workers (12.56% and 10.07%, respectively). Subjects exposed to temperature changes and various irritants (oil fumes, gasoline, diesel fuel, combustion gases, foundry fumes, lead, coal dust and fumes) had twice as much bronchitis than those living and working under good hygienic conditions. All other factors being equal, the frequency of bronchitis was significantly higher (five to six times) among smokers. The frequency of chronic bronchitis in workers engaged in dust free occupations was 5.47% as compared to 18.3% in those exposed to dust (flour mills, textile factories, foundries, coal and silica works); in this category also, smokers had a higher incidence of chronic bronchitis than did nonsmokers.

16137 APTIC NO. 34175

Grabecki, J., T. Haduch, and H. Urbanowicz

THE SIMPLE METHODS OF DETERMINING DELTA-AMINOLEVULINIC ACID (ALA) IN URINE. *(Die einfachen Bestimmungsmethoden der delta-Aminolaevulinsaeure im Harn). Text in German. Int. Archiv Gewerbepathol. Gewerbehyg., vol. 23:226-240, 1967. 18 refs.*

Increased absorption of lead by the organism results in increased Delta-Aminolevulinic Acid (ALA) elimination in urine, the earliest and highly specific symptom of lead poisoning. The Mauzerall and Granick analytical method and two Shuster methods, all based on the formation of pyrrol compounds from ALA, were compared with other methods, based on the property of ALA to form a dye with picric acid in an alkaline medium, and the first method was found to be the best; however, it is time consuming and not suited for routine testing. A modification of this method is described which reduces its duration to 20 min. The modified method condenses ALA in urine with acetylacetone by heating. The resulting pyrrol compound forms with p-dimethylaminobenzaldehyde in acid solution a color complex which is determined spectrophotometrically. The accuracy of the method is 5.8%. Recovery tests yielded an average of 96.5%. Parallel analyses of urine from workers exposed to lead with the original and the modified Mauzerall-Granick method yielded identical results.

16138 APTIC NO. 34151

Green, Gareth M.

INTEGRATED DEFENSE MECHANISMS IN MODELS OF CHRONIC PULMONARY DISEASE. *Arch. Internal Med., 126(3):500-503, Sept. 1970. 10 refs. (Presented at the Workshop on Pulmonary Response to Inhaled Materials: An Evaluation of Model Systems, Castle Harbour, Bermuda, Oct. 24, 1969.)*

Experimental assessment of bronchopulmonary responses to inhaled materials should begin with an analysis of the integrated function of the several defense mechanisms of the lung. The use of radioactive tracer-labeled bacterial aerosol delivered in a quantitative airborne fashion provides an overall evaluation of the hazard of inhaled materials to bronchopulmonary phagocytic activity and clearance. The method permits the division of experimental efforts early in the course of investigation into those that should be direct toward the pathophysiology of transport mechanisms, particularly the mucociliary stream, and those that should be directed toward the pathophysiology of phagocytic mechanisms at deeper levels of the lung. This division early in the experimental program justifies more intensive efforts to pursue pathogenic agents in vitro systems. (Author abstract modified)

16139 APTIC NO. 34006

Grin, N. V.

THE REDISTRIBUTION OF SILICON, IRON, COPPER AND COBALT IN THE BODY OF ALBINO RATS IN COURSE OF INHALATION ROUTE POISONING WITH DUST CONTAINING QUARTZ. *(Pereraspredeleniye kremniya, zheleza, medi i kobalta v organizme* *belykh krys v protsesse ingalatsionnoy zatravki kvartssodezhashchey pylyu). Text in Russian. Gigiena i Sanit., 36(8):100-102, 1971. 4 refs.*

Albino rats were exposed seven hours daily for eight months to quartz containing dust (0.5 mg/cu m) to study its effect on the dynamics of microelement redistribution between various organs. The dust basically consisted of 93.4% silicon dioxide, 21.5 mg% copper, 44.1 mg% iron, and 2.9 mg% cobalt. Increased amounts of Si, Cu, Co were found in the liver tissue after four months of treatment compared to the control rats. The dynamics of Fe, Cu, and Co in the liver were directly related the activity of both glutamic oxaloacetic and glutamic pyruvic transaminases. The Co levels were increased in the kidney tissue of the experimental animals towards the final period of the treatment. Intense accumulation of Si in the lung tissue and increased amounts of Si and Fe, compared to the group, were observed. The Cu was accumulated in kidneys; Co was increased in the spleen, the kidney, and the brain of the treated animals at the end of the experiment. An allergic-like action is attributed to the quartz containing dusts in terms of the dynamics of microelement levels in different organ tissues.

16140 APTIC NO. 33315

Grollet, L.

AIR POLLUTION AND LUNG CANCER. *(La pollution de l air et le cancer du poumon). Text in French. Rev. Pathol. Comparee (Paris), 65:411-412, Sept. 1965.*

Fifty percent of air pollution in Paris is due to domestic heating, 25% to automobile exhaust gases, and 25% to industrial emissions. Hydrocarbons and especially benzopyrenes are carcinogenic. Aerosols which easily penetrate the lungs can disseminate viruses and microorganisms. Air pollution contributes to the genesis of certain forms of cancer by chronic intoxication. Air pollution in Paris is due principally to the numerous emission sources, and its abatement therefore will depend to a degree on the vigilance and discipline of the entire population. Pollution can be reduced by replacement of fossil fuels by electricity and natural gas for domestic heating purposes, by an improvement of internal combustion engines, and by heating entire districts from one central source. In general, hydroelectric power will reduce pollution as will green belts separating industrial from residential areas. For purposes of air pollution control, Paris has been divided into two zones, with the most severe control measures imposed on the northeastern part of the city. Maximum permissible sulfur content levels in fuels were introduced in 1964 and stricter standards will be imposed on both solid and liquid fuels. The emission of all visible fumes will be prohibited in the entire city; this regulation will be enforced by measuring fume opacity. Violations will be penalized by fines.

16141 APTIC NO. 33737

Grosser, P.-J.

AIR POLLUTION AND HEALTH. *(Luftverunreinigung und Gesundheit). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 17(9):641-643, Sept. 1971. 11 refs.*

Epidemiological-statistical methods were used for determination of the relationship between the degree of air pollution and the health condition of the population. Random selections from the polluted areas were compared with those from non-polluted areas. Five criteria were used: life expectancy, mortality, morbidity, physiological features of healthy persons, and subjective reactions. A connection between the degree of air pollution and the occurrence of asthmatic attacks among children between zero and five years of age was determined. A correlation between mortality and the atmospheric pollution was found. The examination of school children of the fourth and fifth grades (examination of the blood, body weight, height, serum phosphatase, electrophoresis, lung volume, and lung ventilation) was more unfavorable for children from polluted areas than those from control areas. In a second study, the lung volume and lung ventilation of 1300 school children of the first, fifth and ninth grade gave similar results.

16142 APTIC NO. 33872

Hall, Robert H., L. T. Steadman, Catherine A. Stroud, James K. Scott, F. A. Smith, and Herbert E. Stokinger

ACUTE TOXICITY OF INHALED BERYLLIUM. IV. STUDIES OF BERYLLIUM FLUORIDE AT CONCENTRATIONS OF 10 AND 1 MG/CU M. *Rochester Univ., N. Y., Atomic Energy Project, Atomic Energy Commission Contract W-7401-eng-49, UR-177, 39p., July 17, 1951. 16 refs.*

Pulmonary lesions were produced in animals exposed daily to beryllium fluoride mist at concentrations of 10 and 1 mg/cu m. These closely resembled the lung changes resulting from inhalation of beryllium sulfate. BeF2 was more toxic than beryllium sulfate. Exposure to 1 mg/cu m BeF2 resulted in lung damage in cats, dogs, rabbits, and rats roughly comparable in extent and degree to that produced by 10 mg/cu m of beryllium sulfate. Hematologic changes, suggestive of the development of macrocytic anemia, occurred in dogs and rabbits exposed to 1 mg/cu m BeF2. The proportion of mature polymorphonuclear leukocytes decreased in the circulating blood. Beryllium tended to accumulate in the lungs, pulmonary lymph nodes, liver, skeleton, and bone marrow of dogs. The rate of deposition in the lungs and lymph nodes increased with the duration of exposure. Deposition in the skeleton was greater in all four species studied than in any other tissue except the lungs and lymph nodes. The evidence suggests that there are specific differences in the rate and manner in which inhaled BeF2 is transported from the lungs to other tissues, or excreted in the urine or feces, in the four species studied. A considerably greater proportion was distributed to other tissues after inhalation of BeF2 than was found in studies of insoluble beryllium oxide and soluble beryllium sulfate mist, possibly because BeF2 is transported in the blood in the form of a soluble, diffusible complex containing one atom of fluorine/mol of beryllium. (Author summary modified)

16143 APTIC NO. 33718

Hattori, H.

EFFECTS OF AIR POLLUTION ON HUMANS. *(Taiki osen no jintai ni taisuru eikyo). Text in Japanese. Ryusan (J. Sulphuric Acid Assoc., Tokyo), 24(7):13-25, July 1971. 14 refs.*

Relationships between pollutant concentrations and specific symptoms of health damages are reviewed in table form with regard to sulfur dioxide, sulfur mist, carbon monoxide, nitrogen oxides, hydrocarbons, ozone, oxidants, and suspended particulates. According to surveys conducted by the Ministry of Health and Welfare as of February 1971, patients diagnosed as suffering from effects of air pollution were: 354 in Kawasaki city; 624 in Yokkaichi city; 1469 in Osaka city; and 574 in Amagasaki city. Perceptible symptoms of major pollutants were as follows: SO2 perceptibility threshold, 3 ppm; discomfort, 8 12 ppm; maximum permissible concentration for labor 5 ppm; and minimum measurability by human reaction, 1 ppm with respect to CO, concentration causing decrease in awareness of time, 50 ppm with 45 90 min of exposure; initial sign of influences on nerve centers, 4 6 hrs of exposure to 30 ppm or one hour of exposure to 120 ppm; and breathing difficulty after exercise when exposed to 40 ppm for eight hours or to 20 50 ppm for an extended period of time with respect to NO2, perceptibility threshold, 1 ppm; perception of considerable odor, 5 ppm; irritation of eyes, nose, and upper air passage, 10 15 ppm; and safety threshold of a short term exposure, 25 ppm. With respect to ozone, perceptibility threshold, 0.02 ppm; irritation of respiratory system and perceivable symptoms in chest and lung function, 0.2-0.3 ppm; resistance in the respiratory tract, one hour of exposure to 0.1 1.0 ppm; and decrease in human sight with 3 6 hrs of exposure to 0.2 0.5 ppm.

16144 APTIC NO. 34294

Heist, Herbert E. and Bruce D. Mulvaney

OLFACTION AND AIR POLLUTION. *Clean Air (J. Clean Air Soc. Australia New Zealand), 4(2):34-37, July 1970. 14 refs.*

Rabbit olfactory tissue, particularly the bipolar sensing cell, was analyzed and cell ultrastructure was determined by electron microscopy. The terminal swelling and cilia are of considerable interest because of their exposed position and presumed initial contact with odor molecules. Exact odor detection sites were not determined, but preliminary radioautographic findings indicate entrance of some of the molecules into the cells. Biochemical investigations have isolated a water-soluble component from the olfactory mucosa which undergoes a conformational change when stimulated by certain odorants in the presence of an ascorbic acid cofactor. Other studies have determined the activity of certain ATPase enzymes associated with the outer membrane of the terminal swelling. The activity in one instance is different from that of the same enzyme isolated from a similar section of brain nerve cells. Following destruction of the olfactory tissue by a one percent zinc sulfate solution, almost complete regeneration of the epithelium occurred within on month. This is encouraging in the light of possible cell injury by air pollutants. Injury by pollution is unlikely to ever be as severe as that caused experimentally by zinc sulfate. Public reaction to odor pollution will probably be more concerned with nuisance and psychological aspects than with actual effects on odor-sensing cells. (Author summary modified)

16145 APTIC NO. 33974

Hirano, Hideo, Yugen Inoue, and Junichiro Tanami

STUDIES ON THE MODE OF ACTIONS OF CARBON MONOXIDE. 3RD REPORT: THE CENTRAL ACTION OF CARBON MONOXIDE. *(Sanka tanso no sayoki jo ni kansuru kenkyu (Daisan-po) -- Issanka tanso no chujiku sayo ni tsuite). Text in Japanese. Nippon Eiseigaku Zasshi (Japan J. Hyg.), 25(6):488-493, Feb. 1971. 18 refs.*

The effect of low concentrations of carbon monoxide on blood glucose levels in rabbits was examined and the results compared with the effects of adrenaline, phentolamine, and propranolol. The changes in glucose level after CO-saline injection was not influenced by the administration of phentolamine or propranolol. There were no changes in blood glucose of reserpinized rabbits, but the effect was positive after repeated injections of adrenaline. In spinal rabbits, injection of CO-saline caused no changes in blood glucose levels while injection of adrenaline increased the level. The changes in blood glucose may be elicited by the central action of free CO and the change induced by CO-saline was not directly related to alpha and beta receptors.

16146 APTIC NO. 33372

Horiuchi, Kazuya and Shunichi Horiguchi

A TRIAL TO ASSUME ABSORPTION AND EXCRETION OF LEAD IN THE HEALTHY JAPANESE POPULATION (REPORT 1). *(Ippan kenko nihonjin no enshushi suitei no kokoromi (sono 1)). Text in Japanese. SangyoZegaku (Jap. J. Ind. Health), 13(5):64-65, Sept. 1971. 10 refs.*

Based on previously reported data, tables of human lead intake from food and drink and lead content in human urine are presented; a graphic analysis of lead content in urine and lead absorption through the digestive tract, all classified according to various age groups is given. The amount of lead obtained by subtracting lead content via digestive system from the total lead content in urine may be assumed to be the amount which has been inhaled from the air without causing deposition of lead (lead surplus). Assuming that 50% of the lead quantity from the inhaled air was absorbed, a reverse calculation can be made in order to estimate the lead concentration in the air that does not cause deposition in the human body. Assuming the average air intake of the adult Japanese per day is 10 m3 and that of a child is 5 m3, cumulative air intake of each age group was used to divide the lead surplus and multiplied by two. According to this calculation, 1.5 to 4.4 micrograms/m3 is the amount of lead concentration in the air that does not cause lead deposition in the human body of adult Japanese between the ages of 40 and 50.

16147 APTIC NO. 34009

Horvath, Steven M., Thomas E. Dahms, and James F. O Hanlon

CARBON MONOXIDE AND HUMAN VIGILANCE. *Arch. Environ. Health, 23(5):343-347, Nov. 1971. 16 refs.*

Carbon monoxide as a factor responsible for deterioration of vigilance in men breathing polluted air was investigated. Ten subjects were exposed for over two hours to CO levels approximating average (26 ppm) and peak (111 ppm) concentrations determined while driving in urban traffic. During the last hour of each exposure, the subjects were given a standard visual vigilance test. Heart rates, minute ventilatory volume, and blood carboxyhemoglobin levels were measured before and after tests. Vigilance was impaired by breathing 111 ppm CO which raised the average COHb level to 6.6%. Heart rates and minute ventilatory volumes were not affected. (Author abstract modified)

16148 APTIC NO. 33345

oosting, P. E.

THE REACTIONS OF THE RESPIRATORY TRACT ON EXOGENOUS STIMULI. II. *(De reactie van de ademhalingswegen op exogene prikkels II). Text in Dutch. Tijdschr Soc. Geneesk., no. 49:463-469, 1971. 20 refs.*

The reactions of the respiratory tract to exogenous stimuli were examined. The response of the respiratory tract and lungs to inhaled particles was mainly dependent on the area of deposition and retention. The effect of the stimuli was determined greatly by particle size and number. Inhaled particles and gases may interact; the effect of sulfur dioxide would be largely determined by the presence of other aerosols. The evoked response could be as nondirect as a sequela of resorption in the nasopharynx. Sequential exposure and smoking had a deteriorating influence on adequate physiological reactions.

16149 APTIC NO. 34302

Joosting, P. E.

MEDICAL ASPECTS OF PHOTOCHEMICAL AIR POLLUTION. *(Medische aspecten van fotochemische luchtverontreiniging). Text in Dutch. Chem. Weekblad, 67(32):F1-F7, Aug. 6, 1971. 4 refs.*

The influences and effects of photochemical air pollution include irritation, nausea, reactions of an obstructive nature, destruction of biochemical properties of lung membranes, and deterioration of lung tissues. Of secondary importance are all other smaller, well documented effects in diverse organs and systems such as acceleration of the aging process. Synergistic effects, epidemiological results, and the acute effects of air pollution are discussed. Attempts have been make to correlate 24 hr values, maximum hourly values, and peak values of nitrogen oxides and carbon monoxide with mortality, hospital admissions, increases in sickness, and eye irritation. Included are chronic effects and community satisfaction as a operational definition of health. Community satisfaction in the Los Angeles and San Francisco area is described. Influence of air pollution on breathing, lungs, and other organs is described. Experiments with humans and animals are included. Effects of ozone, nitric oxide, nitrogen dioxides, oxidants, hydrocarbons, peroxyacetyl nitrate, and other components of photochemical smog are mentioned.

16150 APTIC NO. 33392

Kabayama, Hisao

EYE SYMPTOMS CAUSED BY OXIDANTS (PHOTOCHEMICAL SMOG) AND THEIR TREATMENT. *(Okishidanto (kokagaku sumogu) kogai ni yoru ganshojo to sono shochi ni tsuite). Text in Japanese. Tokyo-to Eisei-kyoku Gakkai-shi (Rept. Tokyo Public Health Studies), no. 47:40-41, June 1971.*

In June 1970, a number of inpatients, doctors, nurses, and outpatients in Toshima Municipal Hospital in the Itabashi ward of Tokyo complained of eye irritation from oxidants. The hospital is located between two main roads and in a congested area of small and medium-size factories. Ocular ache was reported by several inpatients on June 17 and ocular ache and lachrymation by a number of patients, nurses, and doctors on the 23rd. Forty-five patients admitted to the internal medicine ward on the fifth floor (the highest) were the most affected. Eleven to 17 complained daily of eye symptoms from June 23 to June 27, when measured oxidant concentrations were above 0.15 ppm. With the exception of one seriously ill patient, the eye symptoms disappeared after the 28th, when oxidant concentrations declined below 0.15 ppm. The eye symptoms exhibited varied according to individual and wind direction. Predominant symptoms were ocular ache and lachrymination: there were no cases of sore throat or asthmatic attack. Objective findings included increased lachrymation in most victims and, in two cases, diffuse turbidity of the corneal surface, dilation of capillary tubes in the marginal conjunctiva, and flare of the palpebral conjunctiva. Administration of eye drops containing chondron and FAD did not entirely eliminate the symptoms.

16151 APTIC NO. 33864

Kehoe, Robert A.

SUMMARY: RISK OF EXPOSURE AND ABSORPTION OF LEAD. *Public Health Service, Washington, D. C., Symp. Environ. Lead Contamination, 1965, p. 154-157. (Dec. 13-15.) (PHS Pub. 1440.)*

NTIS: PB 198104

The steady rate of building up the body burden of lead, under conditions of steady continuous exposure, continues through the lifetime of an individual. The only presently acceptable criterion for safety from the regular ingestion of lead is the limitation of the average quantity ingested daily to a level which will not give evidence of an increase in the body burden of lead over a prolonged period of time. The threshold point in the regular ingestion of lead by the general population is regarded as being at or near 0.6 mg of lead per day, under conditions in which the opportunity for the inhalation of lead from the ambient air is not significantly greater than at present. The ingestion of lead at the level of 1 mg of soluble lead daily, in addition to that in the daily diet (approximately 0.30 mg daily), will reach a dangerous level in about 8 years; that of 2 mg daily, under comparable conditions, in less than 4 years, while that of 3 mg daily requires only 8 to 12 months. Exposure to air containing lead sesquioxide in a dispersion of particles with a mean diameter of 0.05 micron at the concentration of 0.15 mg/cu m, on the intermittent schedule of 7.5 hrs/day on 5 days of each week, results in a prompt increase in the output of lead in in the urine and in the concentration of lead in the blood. These levels reach their maximum heights within 4 to 6 months. These peaks occurred at about 0.085 mg/l in the case of urine, and at about 0.042 mg/100 grams in the blood. The retention of lead in the respiratory tract during the inhalation of air containing particles of lead sesquioxide ranging from 0.18 micron in diameter amounted to 35 to 40% of that inhaled. Absorption from the lung was prompt and complete. Continuous exposure to air containing 0.15 mg of lead/cu m of air, dispersed in particles ranging up to 0.18 micron in diameter, would result in reaching a dangerous level of absorption in about two years.

16152 APTIC NO. 33605

Klein, Michael, Rosalie Namer, Eleanor Harpur, and Richard Corbin

EARTHENWARE CONTAINERS AS A SOURCE OF FATAL LEAD POISONING. *New England J. Med., 283(13):669-672, Sept. 24, 1970. 12 refs. (Includes comments by Michael Klein and Rosalie Namer, LEAD RELEASE FROM EARTHENWARE, Ibid., 238(23):1292, Dec. 3, 1970.)*

Two young children suffered lead poisoning as a result of drinking juice stored in a modern handmade earthenware jug. One of the children died. Subsequent testing of 264 contemporary earthenware glaze surfaces revealed that 50% released sufficient lead to make them unsafe for culinary use. Between 10 and 25% of the pieces tested would have been capable of causing severe lead poisoning. Pottery samples had been washed with a dilute alkaline-detergent solution, rinsed with distilled water, filled to the top with four percent acetic acid solution, and the volume recorded. Samples were covered with a plastic film and allowed to stand at room temperature for 18 hours. Lead was determined by an atomic absorption technique. Compounding of safe earthenware is essential. (Author abstract modified)

16153 APTIC NO. 33339

Kleinerman, Jerome and George W. Wright

THE EFFECTS OF PROLONGED AND REPEATED NITROGEN DIOXIDE INHALATION ON THE LUNGS OF RABBITS AND GUINEA PIGS. *Preprint, California State Dept. of Public Health, Los Angeles, 12p., 1961. 5 refs. (Presented at the Air Pollution Medical Research Conference, 5th, Los Angeles, Dec. 1961.)*

Rabbits and guinea pigs were exposed to NO2 in various exposure schedules for periods of up to 22 months. No evidence of bronchiolitis obliterans or permanent fibrosis was observed. Even after 21 months of intermittent exposure the animals responded to a single moderately high concentration with histologic evidence of inflammatory reaction, epithelial hyperplasia in the region of the respiratory bronchiole and proximal alveolar duct. The reaction appears less intense than that produced by a single exposure in an animal not previously receiving NO2. A form of respiratory bronchiole ectasia superficially resembling a centrilobular type of human emphysema was observed in several guinea pigs after 15 and 18 months of exposure to low and high doses of NO2. Results indicate that permanent lesions in the bronchioles do not occur following the inhalation of NO2 in the concentrations used. (Author summary modified)

16154 APTIC NO. 34129

Kleinerman, Jerome

EXPERIMENTAL STUDIES RELATING TO THE PATHOGENESIS OF EMPHYSEMA. *Preprint, American Medical Association, Chicago, Ill., 8p., 1970. 22 refs. (Presented at the Air Pollution Medical Research Conference, New Orleans, La., Oct. 5, 1970.)*

The results of experimental studies on the pathogenesis of emphysema are presented. Pathologic changes in the lung, obstruction of airways, pulmonary function, damage to arteries and arterioles, correlation with smoking and air pollution, definitive effects of nitrogen dioxide, effect on enzymes, papain inhalation or instillation, and tissue damage were examined. The results, based on the general hypothesis of an imbalance in proteolytic-antiproteolytic mechanism in the lung, are discussed.

16155 APTIC NO. 33444

Koch, Robert B.

RESPONSES OF ATPASE ACTIVITIES TO OCTANOL AND ASCORBIC ACID. *In: Odor Sensing Cell Ultrastructure by Electron Microscopy. (Final Report).*

Honeywell Corporate Research Center, Hopkins, Minn., Air Force Office of Scientific Research Contract F44620-68-C-0006, P002, TR-71-0712, p. 3-43, Dec. 1970. 28 refs.

NTIS, DDC: AD 720893

Studies were conducted on olfactory tissue adenosine triphosphatases with the view to establishing some connection between an enzymic mechanism and the initiation of odor sensing. Comparisons were made between similar preparations from rabbit brain and olfactory tissue homogenates. Octanol at low concentration (.0004 M) stimulated the sodium-potassium ATPase activity in olfactory tissue, while inhibiting the same activity in brain tissue. Responses of magnesium(2+) ATPase to octanol were the same in olfactory tissue, brain, and liver preparations. Using subcellular fractionation techniques, oligomycin inhibition, sodium iodide treatment, and lubrol solubilization, it was possible to determine that mitochondrial Mg(2+) ATPase was stimulated by octanol; while non-mitochondrial Mg(2+) ATPase was inhibited by octanol. Ascorbic acid (as low as .00004 M) caused inhibition of Na-K ATPase activity under conditions in which it could readily oxidize to dehydroascorbic acid. Mitochondrial Mg(2+) ATPase appeared to be insensitive to ascorbic acid, while non-mitochondrial Mg(2+) ATPase activity was stimulated by it. Implications of results to possible relationships in initial odor sensing processes are discussed. (Author abstract modified)

16156 APTIC NO. 33323

Kolomaznik, L.

PATHOLOGY OF MUCOSA OF THE RESPIRATORY PATHWAYS IN FOUNDRY, GLASS AND ENGINE-SHED WORKERS IN VIEW OF THE PRESENCE OF THE CANCEROGENOUS SUBSTANCE 3,4-BENZPYRENE IN THE WORKING ATMOSPHERE. *(Patologie sliznic cest dychacich u delniku slevarenskeho, sklarskeho prumyslu a vytopen vzhledem k vyskytu kancerogenni latky 3,4-benzpyrenu v pracovnim ovzdusi). Text in Czech. Cesk. Otolaryngol. (Prague), 13(4):233-238, 1964. 5 refs.*

Pathologic manifestations were studied in the mucosa of the upper respiratory pathways, lower respiratory pathways, and the larynx in men working in the foundry and glass industries and in engine-sheds, where high concentrations of the carcinogen 3,4-benzpyrene occur. This hydrocarbon adheres to the surfaces of dust particles; the maximum quantity occurs on particles about 100 micron in size. An increased incidence of precancerous and cancerous conditions in the mucosa was particularly evident in the larynx.

16157 APTIC NO. 33500

Kotrappa, P.

PRODUCTION OF RELATIVELY MONODISPERSE AEROSOLS FOR INHALATION EXPERIMENTS BY AEROSOL CENTRIFUGATION. *In: Annual Report of the Fission Product Inhalation Program. Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex., Fission Product Inhalation Program, ACE Contract AT (29-2)-1013. p. 8-12, Nov. 1970. 6 refs.*

NTIS: LF-43

Strober s aerosol spectrometer, based on a spinning spiral duct, was used as an aerosol centrifuge to separate narrow size groups of insoluble aerosols starting with a polydisperse distribution. The samples collected were resuspended in water and aerosolized with a Lovelace nebulizer to produce relatively monodisperse aerosols. Working with near-spherical fused clay particles, aerosols were obtained with geometric standard deviations of less than 1.1 and with number concentrations which would be practical for use in inhalation experiments. A formula for dilution of monodisperse suspensions for aerosolization was used to calculate the maximum number concentration that could be aerosolized from a suspension for a particular nebulizer, to obtain 95% singlets. This method appears to be particularly adaptable for the aerosols of oxides of transuranic elements. Estimated respiratory depositions of the oxides of plutonium-239, plutonium-238, curium-244, and americium-241 for Beagle dogs breathing the monodisperse aerosols for one hour are given for aerodynamic sizes ranging from 0.5 to 3.0 micrometers. (Author abstract)

16158 APTIC NO. 33785

Kryvova, A. A.

THE COMBINED EFFECT OF CARBON MONOXIDE, SULFUR DIOXIDE AND DUST ON THE CONDITIONAL REFLEX ACTIVITY OF WHITE RATS. *(Kombinovanyy vplyv okysu vuhletsiu, sirchystoho hazu i pylu na umovnoreflektornu diyalnist bilykh shchuriv). Text in Ukrainian. Fiziol. Zh. (Kiev), 17(4):531-533, 1971. 10 refs.*

The combined effect of carbon monoxide, sulfur dioxide, and dust in concentrations corresponding to standards admitted in occupational environments on the conditional reflex activity was studied in white rats. The animals were subjected to chronic treatment for eight months. One experimental Group was exposed to a mixture of 20 mg/cu m and 10 mg/cu m of CO and SO2 respectively for four hours daily six times/wk. The other group was exposed to the above mixture combined with 10 mg of free SiO2/cu m. The dynamics of the cerebral cortex carried the same pattern in both experimental groups after four months of treatment: the latency period of reaction increased by 40%, the positive conditional reflex decreased by 24% and the capacity of differentiation decreased by 27 to 34%. Rats exposed to both dust and gas intoxication elicited a 100% increase of their reflex latency period after six months of treatment. The conditional reflex activity decreased by 24% in both the experimental groups after eight months of treatment. Thus the combined effect of CO, SO2, and dust on the cerebral cortex of white rats consisted an increase of their reflectory latency period and in a decrease of their positive conditional reflex activity.

16159 APTIC NO. 34192

Kubo, Masaji

POLLUTION AND CHILDREN S HEALTH. *(Taiki osen to shoni no kenko). Text in Japanese. Nippon Ishikai Zasshi (J. Japan Med. Assoc.), 60(2):114-120, July 1968.*

The effect of air pollution in Chiba Prefecture on the health of children was investigated. The concentration of settling particulates steadily increased; sulfur dioxide content increased to almost six times that in 1960. The number of allergic children in the polluted areas was 22.2% compared to 14.0% in a control area. The percentage of children with influenza increased from 6.6% in the polluted areas and 3.45% in the control areas in 1966 to 17.9% and 6.9% in 1968. Cases of bronchitis decreased for the polluted areas from 19.23 to 5.03% from October to November 1966 but increased from 3.45 to 9.16% for the control areas. Examinations of third-graders determined that 7.54% of the children in the polluted areas and 6.37% in the control areas had bronchitis. For sixth-graders, 5.56% in the polluted areas and 3.42% in the control areas had symptoms of bronchitis. Relatively healthy children built up resistance to respiratory diseases at the third grade stage.

16160 APTIC NO. 33766

Leloczky, Maria

STUDIES ON THE HEALTH-DAMAGING EFFECT OF THE FLUORINE-POLLUTION OF THE AIR AROUND AN ALUMINUM FACTORY. *(A levego fluorszennyezodesenek egeszseguyi hatasa az Inotai Aluminumkoho kornyeken vegzett vizsgalatok alapjain). Text in Hungarian. Egeszsegtudomany, vol. 15:74-80, July 1971. 21 refs.*

Children in the housing estate Varpalota-Inota were examined for the effects of fluorine pollution from a nearby aluminum foundry. The presence of fluorine in the urine of the children was demonstrated, in some cases at a level usually found in the urine of the foundry workers. In a fluorine-free control area, no fluorine could be demonstrated in urine from children. The hemoglobin level of the children at risk was low. A causal relationship between these findings and the fluorine pollution of air cannot be established because fluorine is only one of the air pollutions around Varpalota-Inota. Further investigations are in progress. (Author abstract modified)

16161 APTIC NO. 34095

Lin-Fu, Jane S.

CHILDHOOD LEAD POISONING...AN ERADICABLE DISEASE. *Children, 17(1):2-9, Jan.-Feb. 1970. 6 refs.*

Surveys have indicated that among children living in slum areas, from 10 to 25% of those between one and six years of age have absorbed potentially dangerous quantitites of lead, although clinical symptoms of lead poisoning have been present in only two to five percent of the children. Until the advent of chelating agents -- therapeutic agents that bind the lead ions and remove them from the body -- about two-thirds of the children with lead encephalopathy died. A follow-up study of 425 children in Chicago who were treated for lead poisoning revealed that 39% had some kind of neurological sequelae. Although clinical symptoms of lead poisoning often do not appear until the blood lead level is .06 mg/100 g of blood or higher, it is generally agreed that the normal blood lead level should not exceed .04 mg/100 g. Lack of awareness of the problem is discussed, as well as voluntary action. The ideal solution to childhood lead poisoning is slum clearance and urban renewal with the provision of adequate housing for families of low incomes. Public education and mass screening programs are also indicated. Urgently needed research is outlined.

16162 APTIC NO. 33509

Lindberg, Z. Ya.

EFFECT OF INSTANT MAXIMUM PERMISSIBLE CONCENTRATIONS OF SULFUR DIOXIDE AND HYDROGEN FLUORIDE WHEN SIMULTANEOUSLY PRESENT IN THE ATMOSPHERE. *(Razovyye predel no dopustimyye kontsentratsii SO2 i HF pri ikh sovmestnom prisutstvii v atmosfernom vozdukhe). Text in Russian. Riga Medical Inst. (USSR) Mater. Dokl. Nauch. Sess. Rizh. Med. Inst., 15th, 1967, p. 42-43.*

The biological effect of sulfur dioxide and hydrogen fluoride when both are present in the atmosphere at their maximum permissible concentration was studied. First the minimum permissible concentration of impurity sensed by olfactory organs of 17 studied people was determined. In case of most sensitive persons it was 1.6 and .04 mg/cu m SO2 and HF, respectively. The indices of concentration of each mixture of HF and SO2 were expressed as sum of fractions of their maximum permissible concentrations when only one is present. The lowest mixture concentration sensed by olfactory organs was a mixture characterizing complete summation of the effect of both components, its index being equal to one. Some atmospheric pollutants cause a change in light sensitivity of an eye, even if in concentration is lower than sensed by olfactory organs. Therefore, the reflex effect of above substances was studied by the adaptometric method. The changes in light senstivity of the eye were observed for mixtures with a mixture concentration index equal to one. The data obtained indicate the summation of effect of SO2 and HF when simultaneously present in the atmosphere.

16163 APTIC NO. 33510

Lindberg, Z. Ya.

EFFECT OF EFFLUENT FROM A SUPERPHOSPHATE PLANT ON WHOLE-BLOOD CHOLINESTERASE ACTIVITY IN ANIMALS EXPOSED UNDER NATURAL CONDITIONS. *(Vliyaniye vybrosov superfosfatnogo zavoda na aktivnost tsel noy krovi u eksperimental nykh zhivotnykh, eksponirovannykh v natural nykh usloviyakh). Text in Russian. Aktual. Voprosy Gig. Truda Prof. Patol., Mater. Konf., 1st, 1967, p. 236-238.*

Experimental animals rabbits and white rats, were kept for five months 1000 from a superphosphate plant at point of maximum atmospheric pollution with the wind blowing in that direction from the plant. The effect of emissions inhaled by the animals was studied; animals were fed by fodder grown in an unpolluted area or by fodder grown in the vicinity of the plant. During the observation, the average concentrations of sulfur dioxide, fluorine, sulfuric acid mist, and nitrogen oxides in the atmosphere were 2.8-6.4 times higher than the maximum permissible concentration. The determination of the activity of whole-blood cholinesterase was accepted as a sensitive test in study of effect of toxic substances on animals. The average daily concentrations of the above substances in the atmosphere in the vicinity of the superphosphate plant unfavorably effect organisms specifically, they increase the activity of cholinesterase.

16164 APTIC NO. 33511

Lindberg, Z. Ya.

EFFECT OF HYDROGEN FLUORIDE AND SULFUR DIOXIDE ON AN ORGANISM WHEN BOTH ARE PRESENT SIMULTANEOUSLY. *(Deystviye ftoristogo vodoroda i sernistogo gaza na organizm pri ikh sovmestnom prisutstvii). Text in Russian. Scientific Research Inst. for Occupational Health and Occupational Diseases, Sverdlovsk USSR, Flyuoroz Ego Profil., Mater. Symp., 1966, p. 131-138.*

Experimental animals located 1000 m from a superphosphate plant were exposed to emissions for five months. The emissions entered the animals both orally and by inhalation. Maximum average fluorine concentration was .15 mg/cu m and sulfur dioxide concentration was .84 mg/cu m. The morphological composition of the blood changed with a decrease in erythrocytes, hemoglobin, sugar, calcium, phosphorous, and cholinesterase activity. Pathological changes in the lungs were also observed. Thus, a safety zone of 1000 m around the production plant is not enough. The combined effects of hydrogen fluoride and SO2 on humans produced olfactory sensations and changes in the light sensitivity of the eyes. The maximum permissible concentration of the mixture expressed as a sum of fractions of maximum permissible concentrations of HF and SO2 must not be more than one. White rats were subjected to three months chronic inhalation of HF and SO2. Changes in motoric chronaxy, cholinesterase activity, and hemoglobin content were observed. Coproporphyrin in the area of animals increased. Also, histologic changes in the lungs occurred. The simultaneous presence of HF and S02 in their maximum permissible individual concentrations is not permissible. The permissible level should be determined from the sum of their relative concentrations.

16165 APTIC NO. 33903

Lob, Marc

ON LEADED GASOLINE II. COMPARATIVE STUDY ON THE LEVELS OF LEAD IN THE BLOOD, URINE, NA DPORPHYRINURIA IN VARIOUS POPULATION GROUPS OF LAUSANNE (OFFICE WORKERS, GARAGE WORKERS, POLICEMEN). *(A propos de la benzine au plomb. II. Etude comparative de la plombemie, de la plomburie et de la porphinurie chez divers groupes de la population lausannoise (employes de bureau, garagistes, agents de police). Text in French. Z. Praeventivmed., 10:172-179, May-June 1965. 20 refs.*

The lead content in blood and the lead and porphyrin content in urine of office workers (40 individuals), and of garage workers (50 individuals) was compared with respective levels in identical worker groups ten years ago (1955/56). The median lead content in the blood of the two population groups was 29 gamma % and 37 gamma %, respectively. In ten especially exposed policemen, 38 gamma % lead was in the blood, however this group was not tested 10 years ago. The levels in office and garage workers exceeded respective levels found 10 years ago by approximately 15 gamma %. Porphyrinuria was not diagnosed in any of the tested individuals. Median lead urine levels found were 24.5 gamma/l in office workers, 37 gamma/l in policemen, and 36 gamma/l in garage workers. The maximal permissible level for urine is 80 gamma/l, 50 to 80 gamma/100 cu cm for blood.

16166 APTIC NO. 33594

Luderitz, P.

EXPERIMENTAL STUDIES CONCERNING THE EFFECT OF CARBON MONOXIDE FROM THE EXHAUST GAS OF VEHICLES ON THE PHYSICAL CONDITION OF TRAFFIC POLICEMEN. *(Experimentelle Untersuchungen ueber die Wirkungen von Kohlonmonoxid aus Kraftfahrzeugabgasen auf den Gesundheitszustand von Verkehrspolizisten). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 17(9):645-646, 1971. 10 refs.*

Over the winter season 1968/1969, eighty policemen and a control group of 40 policemen were subjected to the hexobarbital tolerance test and to examinations of the carboxyhemoglobin concentration in the blood. For determination of subjective complaints, a questionnaire was handed out. The statistical evaluation yielded that carbon monoxide exposed traffic policemen complained significantly more about headache fatigue, sick feeling, and vomiting than the control group. The traffic policemen also complained about eye pains. Blood samples were taken from the policemen before and after their duty. Not much higher COHb values were found in traffic policemen than in smokers. The hexobarbital tolerance test revealed some damage of the central nervous system which was worse than that of smokers. Determination of the reaction time toward different light flashes revealed no difference. These findings make it seem unlikely that CO is the sole cause for the bad physical condition of traffic policemen.

16167 APTIC NO. 33527

Lund, Charlotte

THE EFFECT OF CHRONIC LEAD POISONING ON REPRODUCTIVE CAPACITY. *Nord. Hyg. Tidskr., vol. 18:12-20, 1936. 16 refs. Translated from Swedish. Mundus Systems, McGregor and Werner, Washington, D. C., 11p.*

The effect of chronic lead poisoning on reproductive capacity was reviewed. Cases of infant mortalities and miscarriages were presented. In one example, two cases of miscarriages in the wives of house painters were reported. The women first gave birth to healthy children before the husband became a painter, and a second gave birth to healthy children when the husband ceased being a painter. Both had signs of lead poisoning. A case was reported in 1896 where a woman married to a painter gave birth to two healthy children in the first two years of his being a painter; simultaneously with his showing signs of lead poisoning, she started a series of 15 miscarriages. In 1901, a woman married to a painter had 22 pregnancies, six ending with miscarriages, six with premature birth, and five children died in infancy. She had no history of lead poisoning. In 1906, the normal infant mortality rate in Lille was 8.2%, but among children of painters, 22.9%. It was apparent that the fathers working with lead may have a limited influence as compared with the mothers doing so. Individual animals tests performed in 1914 on rabbits and chickens showed that the progeny of a lead-poisoned male and a normal female were inferior to normal progeny. Of 13 married female lead workers in a printing shop in 1896, having 56 pregnancies, there were 26 miscarriages, nine premature births, one stillbirth, 21 living births at term, and 17 dead shortly after. Other studies showing similar results are reported.

16168 APTIC NO. 33956

Macklem, Peter T.

AIRWAY RESISTANCE AND COLLATERAL VENTILATION. *Preprint, American Medical Association, Chicago, Ill., 9p., 1970. 4 refs. (Presented at the Air Pollution Medical Research Conference, New Orleans, La., Oct. 5-7, 1970.)*

Experimental studies are discussed which indicate that the abnormalities of gas exchange that result from airway obstruction will be critically dependent upon collateral ventilation. Assuming that perfusion distribution remains undisturbed, there are two factors to be considered: the tidal volume of the collaterally ventilated space and the amount of inspired air delivered to the collaterally ventilated space in that particular tidal volume. The tidal volume will be dependent upon the respiratory frequency, decreasing as frequency increases, and on the time constant for collateral ventilation which depends upon the resistance of the collateral channels and the compliance of the collaterally ventilated space. The latter is determined by the degree of interdependence between adjacent air spaces. The amount of inspired gas entering collaterally ventilated spaces will depend upon the site of collateral channels.

16169 APTIC NO. 33447

Makhinya, A. P.

BIOLOGICAL EFFECTS OF SULFUR DIOXIDE AND PHENOL WHEN SIMULTANEOUSLY PRESENT ON THE HUMAN AND ANIMAL ORGANISM UNDER EXPERIMENTAL CONDITIONS. *(Biologicheskoye deystviye sernistogo gaza i fenola pri ikh sovmestnom prisutstvii na organizm cheloveka i zhivotnykh v ek perimentalsnykh usloviyakh). Text in Russian. In: Vop. Gig. Atmos. Vozdukha Naselennykh Mest. 1968. A. P. Shitskova (ed.), Moscow, Nauchno-Issledovatel skii Inst. Gigieny, 1968, p. 57-61.*

The minimum sulfur dioxide and phenol concentrations sensed by olfactory organs when only one of them was present in the atmosphere were .87 mg/cu m and .022 mg/cu m, respectfully and .33 mg/cu m SO2 and .011 mg/cu m phenol when both were present simultaneously. The minimum concentration effecting light sensitivity of an eye and electric activity of brain was .44 and .011 mg/cu m SO2 and phenol, respectively. Combined effects of SO2 and phenol are close to sum of their individual effects. Thus when both SO2 and phenol are present in the atmosphere, their maximum instant concentration expressed as sum of fractions of maximum permissible concentrations of isolated substances, should be less than one. The resorptive effect of low concentrations of SO2 in the presence of phenol on white rats was studied by three months of continuous intoxication by inhalation. The atmosphere containing 1.5mg/cu m SO2 and .5 mg/cu phenol and .5 mg/cu m SO2 and .05 mg/cu m phenol caused considerable pathomorphological changes in white rats organism. Hence, when SO2 and phenol are present simultaneously in the air, the maximum permissible average daily concentration of SO2 and phenol expressed in fractions of the average daily maximum permissible concentrations of isolated substances is recommended to be less than one.

16170 APTIC NO. 33553

Maltoni, Cesare

EXOGENOUS AGENTS ENDOWED WITH CARCINOGENIC EFFECT ON MAN: ENVIRONMENTAL CARCINOGENESIS AND OCCUPATIONAL CARCINOGENESIS. *Bull. Sci. Med., 136(2):135-143, 1964. Translated from Italian by Z. Knowles, National Institutes of Health, Bethesda, Md., Translating Unit, 11p., 1968.*

The modalities of the identification of the environmental carcinogenic agents, the types of tumors provoked, the findings of experimental tests, and measures of prevention were reviewed. Carcinogenic action of an agent is revealed by epidemiological investigation and experimental tests. For an exact evaluation of the carcinogenic danger it is necessary to take into account that the action of agents very similar to one another may vary greatly from agent to agent. The neoplastic response is directly proportional to the dose of carcinogenic agent. The changes provoked by the carcinogenic agents at the level of biological substrates are irreversible. Data relative to the various types of exogenous agents, the site of the tumors provoked in the exposed individuals, and the findings of the tests on the animals for experimental purposes were tabulated. The prevention of tumors provoked in man by carcinogenic agents can be by laws, public information, personal hygiene, technical prevention, the proper selection of individuals destined for jobs which may expose them to carcinogenic agents, and medical control checkups.

16171 APTIC NO. 33696

Matsuo, Koichi

INVESTIGATION ON VARIOUS KINDS OF RESPIRATORY DISEASES WHICH WERE SUPPOSED TO BE AFFECTED BY AIR POLLUTION FROM A STANDPOINT OF A CLINICAL PROFESSION: STATISTICAL STUDY ON OBSTRUCTIVE RESPIRATORY DISEASES UNDER DIFFERENT DISTRICT AND MONTH. *(Yokkaichi ishikaiin no shinryo shita taiki osen no eikyo no aru to omowareru kakushu kokyu shikkan no chosa kenkyu: kakushu heisokusei kokyuki shikkan no chikubetsu tsukibetsu no tokeiteki chosa). Text in Japanese. In: A Study of the Administration Method of Medical Care for Sufferers from Public Nuisance in Yokkaichi City. Committee of Mie Prefectural Medical Insurance on Public Nuisance (Japan), p. 43-66, March 1970.*

The rate of incidence of chronic obstructive respiratory diseases was studied annually and seasonally in Yokkaichi and the results were correlated with the possible effects of air pollution. Patients with symptoms of bronchial asthma, chronic bronchitis, asthmatic bronchitis, and pulmonary emphysema were questioned for age, residence, occupation, and health insurance. There was greater incidence of diseases for the ages under ten and over 60; this was especially true for cases of pulmonary emphysema in the over-60 age group and asthmatic bronchitis for the under-ten group. Regionally, Shiohama had a greater incidence of diseases than any other area.

16172 APTIC NO. 34114

McAllister, Russell G., Andrew M. Michelakis, and Harold H. Sandstead

PLASMA RENIN ACTIVITY IN CHRONIC PLUMBISM. *Arch. Internal Med., vol. 127:919-923, May 1971. 30 refs.*

Plasma renin activity was found suppressed in two patients with chronic plumbism of different etiologies (moonshine ingestion and industrial poisoning). After long-term therapy with edetate disodium calcium administered intravenously to reduce the total body burden of lead, the plasma renin activity returned to normal. The evidence presented is compatible with the hypothesis that lead deposition in renal tissue impairs processes leading to renin production or release or both and that this abnormality may be corrected with edetate disodium calcium therapy. This is the first demonstration of an endocrinopathy apparently due to lead which can be reversed by chelation therapy. (Author abstract)

16173 APTIC NO. 34041

McKee, William D.

ENVIRONMENTAL PROBLEMS AND THE ALLERGIST. *Ann. Allergy, 29(10):510-524, Oct. 1971. 39 refs. (Presented at the American College of Allergists, Annual Congress, 27th, San Francisco, Calif., April 1, 1971.)*

Allergy specialists are confronted daily by patients suffering from disease caused by irritation of mucous membranes, particularly in the nasal and bronchial areas from chemicals found in air pollution. There are two major types of urban air pollution: sulfur dioxide particulates and photochemical smog. The SO2 particulate form is the result of combustion of coal and oil in urban factories, utilities and residential heating, and is more prevalent during cold winter months. Particulates smaller than five micron diameter may get into the smaller bronchioles. Also, SO2 can be oxidized by ozone to sulfur trioxide and then, particularly in a humid atmosphere, be converted to sulfur acid mist. Photochemical smog is largely the result of incomplete combustion of gasoline in the automotive internal combustion engine. Carbon monoxide, unburned hydrocarbons, and nitrogen oxides are produced, and in the presence of sunlight the hydrocarbons and nitrogen oxides combine to produce ozone and peroxyacetyl nitrate. The SO2 is harshly irritating, paralyzing ciliary action and stimulating mucus production, as well as causing bronchospasm and edema. Ozone and nitrogen dioxide have similar effects; both forms can cause increased airway resistance and interfere with the clearing mechanism of the bronchi. In acute episodes of air pollution, excess deaths have been reported, primarily in the very young and old. In Buffalo, hospital admissions for children with asthma were 32.4 per 100,000 in the least polluted sections, in contrast to 50.7 per 100,000 in the heaviest polluted areas. Studies have shown decreased pulmonary function in Japanese residents of the Tokyo-Yokohama area when compared to residents of a non-polluted area. Hydrocarbons are probably involved in the rising incidence of lung cancer deaths, particularly benzopyrene, which is a known carcinogen. Sources of air pollution are reviewed, including environmental impact and pollution control.

16174 APTIC NO. 34194

Miyaji, K., S. Yamazaki, H. Kashiwagi, S. Takahashi, and A. Watanabe

ASTHMATIC DISEASES IN YOKKAICHI AREA - CLINICAL STUDIES. *(Yokkaichi chiku ni okeru zensokuyo shikkan - rinshozo o chushin to shite). Text in Japanese. Naika, 21(5):850-858, May 1968. 6 refs.*

Air quality measurements correlated with respiratory diseases were studied for the Yokkaichi area. Atmospheric concentrations of sulfur dioxide, sulfur trioxide, hydrogen sulfide, mercaptans, hydrocarbons, and settling particulates increased. The SO2 content fluctuated sporadically and drastically between zero and high peaks of 0.5-1.0 ppm. Based on reports of government health insurance cases, the values for pharyngitis and bronchial asthma increased annually since April 1961, with twice as many cases in the polluted areas as in the non-polluted areas. Bronchial asthma cases were especially prevalent among patients under five and over 50 years old. Influenza and bronchitis increased in the polluted areas, and cases of lung cancer rose suddenly between April 1964 and March 1965. The number of chronic bronchitis cases increased from 1.63% in 1959 to 8.0% in 1967, correlated with an oil industry complex which started operation in 1962; bronchial asthma cases increased from 3.14% in 1962 to 7.4% in 1967. Most of the cases attending the clinic after 1962 were ambulatory, but 60% of all the cases were bronchial asthma patients.

16175 APTIC NO. 34091

Mokranjac, Momcilo St. and Sava Radmic

CONTRIBUTION TO THE QUESTION OF NORMAL LEAD CONTENT IN THE BLOOD. *(Prilog pitanje normalnog sadrzaja olova u ljudskoj krvi). Text in Serbo-Croatian. Glas. Hem. Drus. Beograd, vol. 20:563:568, 1955. 8 refs. (Presented at the Chemical Association NR of Serbia, 4th, Jan. 1965.)*

The quantities of lead normally contained in the blood of inhabitants of the city of Belgrade and of villagers from various areas of Yugoslavia were determined. The results show distinct differences between persons living in Belgrade and those living in country areas which are far from larger towns. Comparisons made between the two conditions can be summarized as follows: The lead content varied from 22 to 67 micrograms/100 cu cm of blood in Belgrade, against 19 to 40 micrograms in the country. The average Pb content amounted to 38 micrograms for Belgrade, against 32 micrograms in the country. The percentage of cases below 30 micrograms Pb/100 cu cm of blood was 12% in Belgrade and 25% in the country. The percentage of cases between 30 and 40 micrograms was 51% in Belgrade, 75% in the country. Lead content above 40 micrograms occurred with 37% of the cases in Belgrade, but in no cases in the country. The variations between individual amounts of Pb in the blood were much less pronounced in villagers than in city inhabitants.

16176 APTIC NO. 34052

Motley, Hurley L.

ENVIRONMENTAL AIR POLLUTION EFFECT ON PULMONARY FUNCTION. *Aerospace Med., 42(10):1108-1110, Oct. 1971. 12 refs. (Presented at the Aerospace Medical Association, Annual Meeting, 42nd, Houston, Tex., April 26, 1971.)*

Air pollution aggravates preexisting respiratory and circulatory conditions in man. Oxidants, oxides of nitrogen and sulfur, carbon monoxide, and particulates are the more important pollutants increasing airway resistance and bronchospasm and impairing oxygen transfer and transport in the lungs and blood with hypoxia. Significant changes in pulmonary function measurements occur from breathing smoggy air in Los Angeles and similar changes occur from cigarette smoking. The allergic aspect is an important factory in many patients. A significant increase in arterial oxygen partial pressure occurs in some patients on 100% oxygen breathing with intermittent positive pressure breathing (IPPB), as compared to ambient 100% oxygen breathing, indicating small collapsed areas at the alveolar level perfused with blood but not ventilated, but which can be opened up with IPPB (microatelectasis). Lack of surfactant appears a possible factor. Cigarette smokers have high arterial carbon monoxide hemoglobin saturation, three to four times that of non-smokers even in Los Angeles. Cigarette smoking presents a far greater hazard from carbon monoxide for flying personnel and cardio-respiratory patients than breathing the Los Angeles smoggy air. (Author abstract)

16177 APTIC NO. 33342

Mulvaney, Bruce D. and Herbert E. Heist

CENTRIOLE MIGRATION DURING REGENERATION AND NORMAL DEVELOPMENT OF OLFACTORY EPITHELIUM. *In: Odor Sensing Cell Ultrastructure by Electron Microscopy. (Final Report). Honeywell Corporate Research Center, Hopkins, Minn., Air Force Office of Scientific Research Contract F44620-68-C-006, P002, TR-71-0712, p. 79-97, Dec. 1970. 18 refs.*

NTIS, DDC: AD 720893

Olfactory tissue from the nasal septum of a fetal, a 30-day old, and an adult rabbit was dixed in phosphate buffered osmium tetraoxide, dehydrated, embedded in Epon 812, sectioned, and stained for electron microscope observation. The incidence of centriole migration at pre-selected levels in developing rabbit olfactory epithelium was determined. Observations of tissues from variously aged specimens and regenerating tissue from adults have shown centriole migration to be a developmental phenomenon which also persists in fully developed tissue. These observations and a comparison of sensory cell densities at two tissue levels support a hypothesis that olfactory cell development persists well into the adult life of the animal. (Author abstract modified)

16178 APTIC NO. 33441

Mulvaney, Bruce D. and Herbert E. Heist

REGENERATION OF RABBIT OLFACTORY EPITHELIUM. *In: Odor Sensing Cell Ultrastructure by Electron Microscopy. (Final Report). Honeywell Corporate Research Center, Hopkins, Minn., Air Force Office of Scientific Research Contract F44620-68-C-0006, P002, TR-71-0712, p. 55-77, Dec. 1970. 17 refs.*

NTIS, DDC: AD 720893

Epithelial regeneration was determined with light and electron microscopy after preferential chemical destruction of olfactory epithelium in rabbits. Regeneration of either olfactory epithelial ciliated columnar epithelium or a mixture of the two occurred. Previously observed interspecies variation in olfactory regenerative capability is therefore also an intraspecies variable. The ducts or glands of Bowman appeared to furnish the cells for either type of epithelial regeneration. Well differentiated olfactory cells reappeared as early as eight days after destruction with olfactory regeneration essentially completed 30 days after destruction. (Author abstract)

16179 APTIC NO. 33859

Mulvaney, Bruce D. and Herbert E. Heist

RADIOAUTOGRAPHY OF OLFACTORY EPITHELIUM. *In: Odor Sensing Cell Ultrastructure by Electron Microscopy. (Final Report). Honeywell Corporate Research Center, Hopkins, Minn., Air Force Office of Scientific Research Contract F44620-68-C-0006, P002, TR-71-0712, p. 99-103, Dec. 1970. 2 refs.*

NTIS, DDC: AD 720893

Radioautographic experiments, which trace radioactive odorants in olfactory tissue, have shown that odorants can enter the cells of the olfactory epithelial layer. Further, the microradioautographs have shown odorant distribution within the epithelium, which in some cases closely matches the distribution of intracellular structures called inclusion bodies. Odorants with differing molecular weights enter the cells in different amounts. Experiments were conducted using a sulfur-35 tagged odorant which offered the advantage of much shorter half-life than carbon-14 and high specific activity. Sample preparation techniques are indicated.

16180 APTIC NO. 33497

Muniak, S. E.

SURFACE ATMOSPHERIC LEAD AND WHAT DEPOSITS ON HUMAN ALVEOLI. *In: Radiological Physics Division Annual Report. Environmental Studies. Argonne National Lab., Ill., Radiological Physics Div., p. 156-162, 1970. 15 refs.*

NTIS: ANL-7760, Part III

Lead concentrations in surface atmospheric particulates at Argonne for 24 months were obtained and are reported in nanograms/cu m and microgram/100 mg particulates. Both measures show that the weighted mean for the season has shifted to higher values with time. The most recent weighed mean of the season (winter 1969-1970) is 860 ng/cu m of lead in the Argonne surface atmosphere. The lead came from motor vehicles. Thus, the net mean lead deposited in the alveoli was 2320 ng/day during the season. Breathing Argonne air contributes 10% of the total lead taken into circulation (21.3 mg/day).

16181 APTIC NO. 33871

Niden, Albert H. and Heribert Schulz

THE ULTRASTRUCTURAL EFFECTS OF CARBON MONOXIDE INHALATION ON THE RAT LUNG. *Arch. Path. Anat. (Berlin), vol. 339:283-292, 1965, 18 refs.*

Rats were exposed by inhalation techniques to 0.5% and 1.0% CO for 13 to 137 min. The pulmonary ultrastructural alterations consisted of swelling of alveolar epithelial cell mitrochondria and nucleoplasm, capillary endothelial and alveolar epithelial swelling, and capillary platelet thrombosis. Due to the swelling of the epithelium, defects are formed in the alveolar lining and the basement membranes of the capillaries are no longer covered with epithelium. As a result of the marked swelling of endothelium and epithelium, the lumina of the capillaries and alveolar spaces appear to be narrow and slit-like. The concentration of inhaled CO was more important than the level of blood carboxyhemoglobin and the duration of exposure to CO in producing these changes. The results suggest that CO has a direct effect on pulmonary tissue. (Author summary modified)

16182 APTIC NO. 34190

Nose, Yoshikatsu

SUDDEN AIR POLLUTION AND RESPIRATORY DISEASES. *(Toppatsuteki taiki osen to kokyukikei kanja). Text in Japanese. Naika, 21(5):851-849, May 1968. 19 refs.*

The correlation between a sudden increase in sulfur dioxide concentration due to an accident in a chemical factory in Ube City and the increase in symptoms of discomfort, respiratory diseases, and deaths was investigated. Concentrations of SO2 and dust particles, temperature, humidity, and wind direction and velocity were determined and plotted for monthly variations. Epidemiologic studies determined a definite parallel between the rise in SO2 concentration and dust and the increase in number of patients. Most patients suffered from quasi-influenza of the upper respiratory tract, which constituted 95% of the cases of respiratory illnesses among babies. Cases of bronchitis decreased and bronchial asthma and pneumonia increased among the aged. Death rates rose from 3% in June to 14.1% in July-August, with a marked increase on the days following the rise in SO2 concentration. Daily examinations determined a definite reaction (higher temperatures and pulse rates) of chronic respiratory and lung tuberculosis patients to air pollution.

16183 APTIC NO. 33694

Okamoto, Yoshimichi

SURVEY FOR CHRONIC OBSTRUCTIVE PULMONARY DISEASE AND ERYTHROCYTES IN YOKKAICHI DISTRICT. *(Yokkaichi chiku ni okeru mansei heisokusei hai shikkan to sekkekyu ni kansuru chosa kenkyu). Text in Japanese. In: A Study of the Administration Method of Medical Care for Sufferers from Public Nuisance in Yokkaichi City. Committee of Mie Prefectural Medical Insurance on Public Nuisance (Japan), p. 83-87, March 1970.*

The relationship between chronic obstructive pulmonary diseases and an increase in erythrocytes was investigated for 227 patients in the area of Yokkaichi. A peripheral blood test was administered to patients with diagnosed bronchial asthma, chronic bronchitis, bronchitis with asthma, and pulmonary emphysema. The erythrocytic increase, determined by the red blood cell count and hemoglobin value, in patients with pulmonary tuberculosis was designated the control. Erythrocytic increase was slight in the adolescent stage (10-29 years old) and minimal in the senile stage (over 60 years old). The increase in erythrocytes was considerable for all the stages for all the chronic obstructive pulmonary diseases except pulmonary emphysema. For the four diseases, there were more cases of erythrocytic increase in the adolescent stage and fewer cases of increase in the middle stage (40-59 years old).

16184 APTIC NO. 33869

Park, J. F., E. B. Howard, B. O. Stuart, A. P. Wehner, and J. V. Dilley

COCARCINOGENIC STUDIES IN PULMONARY CARCINOGENESIS. *National Cancer Inst., Bethesda, Md. and Atomic Energy Commission, Washington, D. C. Proc. Conf. Morphol. Exptl. Respirat. Carcinogenesis, Gatlinburg, Tenn., 1970, p. 417-436. 22 refs. (May 13-16.)*

NTIS: CONF-700501

Cocarcinogenic experiments are currently in progress to determine the pathogenesis of several potentially carcinogenic materials on the induction of pulmonary neoplasia in experimental animals. The role of plutonium-induced lymphopenia and lymphatic pathology is being evaluated in the pathogenesis of pulmonary neoplasia induced by inhalation of plutonium dioxide in beagle dogs. Hamsters and dogs are being exposed to combinations of uranium mine air contaminants including radon daughters, uranium ore dust, diesel engine exhaust, and cigarette smoke. The cocarcinogenicity of inhaled asbestos, nickel oxide, cobalt oxide, and cigarette smoke is being investigated in hamsters. (Author abstract)

16185 APTIC NO. 33946

Pastega, G.

DEATHS DUE TO CANCER IN VENICE AS A FUNCTION OF CERTAIN ONCOGENOUS FACTORS. *(La mortalita per tumori a Venezia in rapporto ad alcune cause oncogene). Text in Italian. Minerva Med., vol. 57:1747-1756, 1966. 56 refs.*

Venice is of special demographic and epidemiological interest because of its unique combination of communities. The historic city of Venice, located in the middle of a lagoon, in importance and population. In this section and in estuarial Venice, comprising a number of small islands scattered through the lagoon, modern industrialization has made no impact and motor traffic is almost non-existent with the exception of the island of Murano, center of an ancient glassmaking industry. The city also includes a section of mainland, including Mestre and Marghera. This latter section has recently been dramatically transformed from an agricultural area to an important industrial complex. While the population of Venice proper declined by 23% from 1951 to 1961, the populations of Mestre and Marghera increased by 67% and 260% respectively. Since 1923, Mestre-Marghera has become important in metallurgy, chemical industries, and shipbuilding, and Marghera is now the third most important seaport in Italy. A series of studies extending back to 1911 indicates an important and growing increase in mortality due to cancer of the respiratory tract in the Mestre Marghera complex: an 8-fold increase over a 40-year span. On the other hand, during the years 1949-1953, the Mestre-Marghera mortality level was lower than the rest of Venice, possibly because of a higher percentage of elderly people in the old part of the city and an influx of young, healthy immigrants to the rapidly industrialized section. Earlier studies are supplemented by a study conducted from 1960 to 1962; the data are compared with figures from the rest of Italy for the same period and with figures for 1950-1952.

16186 APTIC NO. 33485

Paterson, J. C.

STUDIES ON THE TOXICITY OF INHALED CADMIUM. III. THE PATHOLOGY OF CADMIUM SMOKE POISONING IN MAN AND IN EXPERIMENTAL ANIMALS. *J. Ind. Hyg., vol. 29:294-301, Sept. 1947. 7 refs.*

Pathological findings in experimental animals exposed to cadmium oxide or cadmium chloride are confined to the lungs and vary with the survival period. Three clearly demarcated stages were observed: acute pulmonary edema, developing within 24 hours of exposure, and reaching its peak within three days; proliferative interstitial pneumonitis, lasting from the third to the tenth day; and permanent lung damage in the form of perivascular and peribronchial fibrosis. The pathological findings in two men who died five and eight days, respectively, after exposure to cadmium oxide fumes were identical to those in experimental animals. Approximately 25% of animals which survive cadmium exposure show residual pulmonary fibrosis. This may also occur in men who survive large doses of cadmium oxide. The upper limit of dosage of cadmium fumes to which rats can be exposed repeatedly without causing pulmonary fibrosis was determined. Extrapolation to man yields a recommended allowable concentration of 0.1 mg/cu m of factory air to provide an adequate margin of safety to the industrial worker. Repeated small inhalation doses of cadmium fumes were non-carcinogenic in the rat. Until human data are available, it may be assumed that lung cancer is not an occupational hazard in the cadmium industry. (Author summary modified)

16187 APTIC NO. 33964

Pavanello, R. and D. Rondia

ODOUR NUISANCE AND PUBLIC HEALTH. PART 2. *Water Waste Treat., 14(5):2A-3A, June 1971. 9 refs.*

Offensive odors and public health are reviewed with respect to available literature, odor and fear, somatic reactions, and prevention of pollution by odoriferous products. Data on the effects of odor nuisance on human health are scarce and very subjective. Careful epidemiological studies are needed to detect long-term effects; short-term effects (vomiting, headache, or asthma) are occasionally attributed to emissions of an occasional type. Most regulations on odorous emissions concern paper pulp works. Existing technology on odor counteraction is inadequate.

16188 APTIC NO. 33989

Pirnay, F., J. Dujardin, R. Deroanne, and J. M. Petit

MUSCULAR EXERCISE DURING INTOXICATION BY CARBON MONOXIDE. *J. Appl. Physiol., 31(4):573-575, Oct. 1971. 24 refs.*

Metabolic, circulatory, and respiratory responses were analyzed during muscular exercises in which carbon monoxide intoxication immobilized 15% of the hemoglobin. During moderate exercise, oxygen consumption was not modified and induced a ventilation comparable to that measured under normal circumstances. Heart rate, however, increased from 128.1 to 142.7 beats/min, due to a larger cardiac output brought about by the decrease in oxygen carrying capacity of the blood. During maximum exercise, maximal oxygen consumption was reduced 15.1% in spite of higher heart rate and relative hyperventilation. The reduction in maximal oxygen consumption paralleled the reduction of the oxygen transport possibilities of the blood, confirming the existence of a circulatory limitation upon maximal oxygen consumption. (Author abstract modified)

16189 APTIC NO. 33779

Pott, F. and A. Brockhaus

COMPARISONS OF ENTERAL AND PULMONARY ABSORPTION RATES OF LEAD COMPOUNDS. *(Vergleich der enteralen und pulmonalen Resorptionsquote von Bleiverbindungen). Text in German. Zentralbl. Bakteriol., Parasitenk. Infektionskr. Hyg.: Abt. 1: Orig., Reihe B, vol. 155:1-17, 1971. 16 refs.*

Rates of enteral and pulmonary absorption of lead by 235 rats were examined. Various dosages of two lead compounds of different solubility (lead bromide and lead oxide) were administered, orally or intratracheally, eight or 24 times. To obtain models of 100% absorption, corresponding groups of animals received lead intravenously. Lead content in bone tissue served as a measure of the amount absorbed. Examination of lead in the complete skeletons of 16 animals revealed that the content of the femora was fairly consistent, amounting to 6.8%. Therefore, femora lead was regarded as representative of the entire bone tissue and the lead assay was restricted to the femora. Amounts of lead in femoral bone tissue were the same after intratracheal and intraveneous injection. However, no more than five percent was demonstrable following oral administration. The findings suggest that atmospheric lead from leaded gasolines is of much greater biological importance than lead in foodstuff. (Author abstract modified)

16190 APTIC NO. 33417

Prerovska, Ivana and Sona Drdkova

INFLUENCE OF CHRONICAL EFFICIENCE OF CARBON MONOXIDE ON CLINICAL STATE AND BIOLOGICAL CHANGES IN THE SERUM OF EXPOSED PERSONS IN VIEW OF PRECOCIOUS DEVELOPMENT OF ATHEROSCLEROSIS. *(Der Einfluss der chronischen Einwirkung von Kohlenoxyd auf den klinischen Zustand und biochemische Veraenderungen im Serum exponierter Personen in Hinsicht auf die vorzeitige Entwicklung der Atherosklerose). Text in German. Int. Arch. Arbeitsmed., vol. 28:175-188, 1971. 23 refs.*

In 1964, 50 persons aged 20-40 years, workers from an environment with carbon monoxide concentrations, were examined with an equally large control group. Carbon monoxide concentrations in the atmosphere varied, in some cases measuring up to 0.1 vol%, while the level of carboxyhemoglobin in the blood was between 2.0 and 26%. The duration of exposure was 10.5 years on the average. Blood pressure measurements, electrocardiograms, examination of the fundus of the eye, and serum lipid determinations did not show any deviations suggesting early development of atherosclerosis in the exposed workers. Both groups were checked in the same way again in 1970. The clinical condition of the workers from the hazardous environment still did not show any earlier or more substantial arteriosclerotic changes than the population of similar age span. However, in persons with sclerotic vessels, the increase of anoxia associated with a higher exposure to carbon monoxide might lead to more serious changes of the organs. (Author summary modified)

16191 APTIC NO. 33986

Racoveanu, Carmen, M. Manicatide, and V. Nicolaescu

EPIDEMIOLOGIC STUDY OF CHRONIC BRONCHITIS IN TWO REGIONS WITHOUT INDUSTRIAL AIR POLLUTION. *(Cercetari epidemiologice asupra brositei cronice in doua zone fara poluare atmosferica industriala). Text in Rumanian. Stud. Cercet. Med. Interna, 12(4):359-367, 1971. 27 refs.*

The incidence and prevalence of chronic bronchitis among the inhabitants of two regions free of industrial pollution were epidemiologically investigated. Based on questionnaires, clinical examinations, and respiratory function tests, including bronchial reactivity to acetylcholine, 300 subjects each in the Danube Delta and Fundata were tested. The incidence of chronic bronchitis was higher among the inhabitants of the mountainous region than among those in the delta, correlated with more marked bronchial reactivity in the mountainous region. Correlations between chronic bronchitis incidence, smoking, and lung diseases were examined.

16192 APTIC NO. 33958

Rankin, John

RUBBER PLANT STUDIES. DELAYED HYPERSENSITIVITY OF THE RESPIRATORY TRACT. *Preprint, American Medical Association, Chicago, Ill., 6p., 1970. (Presented at the Air Pollution Medical Research Conference, New Orleans, La., Oct. 5-7, 1970.)*

Polymerization and polycondensation are discussed, and the many stages in the handling of plastics are indicated. The epidemiology of recurrent episodes of severe lung disease suffered during 1961 and early 1962 by a large number of employees in a rubber tire plant is discussed. The chemistry of the adhesive system for bonding textile fibers to rubber is also considered. Although still inconclusive, present evidence strongly suggests that small molecular volatile components and reaction products of some plastics combine with proteins in the respiratory tract and initiate a delayed hypersensitivity reaction analogous to allergic dermatitis produced by skin contact. If such a mechanism exists, the haptenic substances may produce an urban air pollution problem of sizable importance for public health.

16193 APTIC NO. 33537

Renander, Axel

ROENTGENOLOGICALLY OBSERVED REVERSIBLE CHANGES IN CASES OF PULMONARY DAMAGE

FROM NITROUS GASES. (Roentgenologisch beobachtete reversible Veraenderungen bei nitroesem Gasschaden an den Lungen). Text in German. Acta Radiologica (Stockholm), 27(2):152-160, April 1936. 5 refs.

Results of histological examinations in cases of lung damage from inhalation of brown nitrous gases were reviewed in order to shed light on the significance of roentgenologically observed miliary tuberculous-like changes which were reversible in character. The lung fields were clear within eight days following inhalation of the gases. Serial examinations of the lungs and heart revealed an increase in the transverse diameter of the heart probably related to a myocardial injury produced by the inhalation of the gas. Cases which ended in death manifested alveoli filled partly with air, partly with a fibrous exudate poor in cells which contained leucocytes, erythrocytes, small fat balls, and multinuclear giant cells. Since X-ray examination yields similar findings in miliary tuberculosis and in cases of NO2 inhalation, the case history is decisive in the differential diagnosis.

16194 APTIC NO. 33987

Ribeiro, Herval Pina

CORRELATION BETWEEN SUPERIOR AIR TRACT INFECTIONS, ASTHMA, AND AIR POLLUTION. *(Estudo das correlacoes entre infeccoes das vias aereas superiores, bronquite asmatiforme e poluicao do ar em menores de 12 anos em Santo Andre). Text in Spanish. Pediat. Prat., 47(4,5,6):9-54, 1971. 88 refs.*

Children under 12 years old were examined for symptoms of acute respiratory diseases, e.g., asthma, infections of the superior air tract, pneumonia, and bronchitis, and the results correlated with monthly and annual data on air pollution. Air temperature, relative humidity, wind speed, atmospheric stability, sulfur dioxide concentrations, and dustfall were determined for the County of Santo Andre. The results confirmed a significant correlation between respiratory diseases in children under 12 years old and air pollution.

16195 APTIC NO. 33910

Richter, R. H. H., and Ch. Schlatter

THE EFFECT OF LEAD FROM AUTOMOBILE EXHAUST GASES ON DOMESTIC ANIMALS. *(Zur Frage der Wirkung von Blei aus Motorfahrzeugabgasen auf Nutztiere). Text in German. Bull. Eidgenoess. Gesundheitsamtes, Beilage B., no. 3:154-168, March 1971. 171 refs.*

Whether inhalation of air polluted by lead causes changes in domestic animals is not known. The intake of contaminated feed leads to abnormal resorption and accumulation of lead in the organism, even though only one fifth to one tenth of the ingested lead is absorbed, compared with inhaled lead. The levels of lead found in organs and bones of milk cows fed contaminated fodder were up to 20 times higher than normal (pelvic bones were 24.99 ppm and 1.862 respectively). Numerous cases of lead poisoning of domestic and wild animals have been described where lead acted as a nerve, blood, capillary, metabolic, and cellular nuclear poison. The acutely lethal dose depends on the species, age, state of health, condition of the gastrointestinal tract, resorption and elimination rate, and previous exposure to low lead concentrations. Symptoms of chronic intoxication are anemia, reduced erythrocyte and thrombocyte count, loss of weight, loss of energy, cachexia, colic, spasms, and a variety of other abnormal manifestations. While the normal lead blood level is 0.25 ppm, animals with 1.52 ppm lead blood level need not yet show symptoms of intoxication.. Observations made on experimentally intoxicated cattle, calves, steers, sheep, dogs, guinea pigs, rabbits, mice, rats and aquatic birds are described. A daily intake of one to three g lead per cow (50-200 ppm in fodder), while tolerated by the animals without visible symptoms for years, can result in reduced milk production, abortion, and diseased calves.

16196 APTIC NO. 33607

Rondia, D.

TOXICITY OF ENGINE EXHAUST GASES. *(Toxicite des gaz d echappement de moteurs). Text in French. Ingenieursblad, 40(15-16):429-435, 1971. 12 refs.*

Carbon monoxide, lead, and hydrocarbons are considered the most significant air pollutants. The main source of CO pollution is automobile exhaust, amounting to 60 million tons, or 60%; forest fires contribute 17%; industry cause 11%; incineration of refuse cause eight percent; and heating cause two percent. Inside of an automobile, the CO concentration can be as high as 100 ppm, or more if the occupant of the car smokes, since inhaled cigarette smoke contains about 500 ppm of CO. Carbon monoxide reacts with hemoglobin to form carboxyhemoglobin which deprives the blood of its oxygen carrier. A concentration of 30 ppm CO in the air will, after eight hours inhalation, transform five percent of the hemoglobin into carboxyhemoglobin. The most prominent source of air pollution by lead in recent years has been the use of tetraethyl lead as antiknock agent in gasoline. About 80% of this lead is released into the air with the exhaust gases in thy form of lead bromide, chloride, and oxide particles. Lead causes a partial inactivation of certain enzymes which are responsible for the synthesis of the blood hemoglobin, resulting, in the long run, in some degree of anemia. Of the hydrocarbons contained in automobile exhausts, the aliphatic group is gaseous, hardly toxic, and odorous. The polycyclic hydrocarbons, on the other hand, are emitted in the form of particles. Some of these, such as benzopyrene are carcinogens.

16197 APTIC NO. 33757

Rylander, Ragnar

LUNG CLEARANCE OF PARTICLES AND BACTERIA. *Arch. Environ. Health, 23(5):321-326, Nov. 1971. 16 refs.*

The ability of the lung to clear particles and viable bacteria was studied in guinea pigs exposed to cigarette smoke. The animals were given fresh puffs of cigarette smoke and were then exposed to a mixed aerosol of killed radioactive and viable bacteria, an indicator of the phagocytic lung activity, was determined. Smoke from cigarettes of high and medium tar content decreased mechanical and bactericidal clearance; mechanical clearance flow was affected earlier than bactericidal clearance. (Author abstract modified)

16198 APTIC NO. 34162

Rylander, Ragnar

STUDIES OF LUNG DEFENSE TO INFECTIONS IN INHALATION TOXICOLOGY *Arch. Internal Med., 126(3):496-499, Sept. 1970. 16 refs. (Presented at the Workshop on Pulmonary Responses to Inhaled Materials: An Evaluation of Model Systems, Castle Harbour, Bermuda, Oct. 24, 1969.)*

Experimental models used to study the defense of the lung to infectious agents are evaluated. The various lung defense mechanisms are chiefly the mechanical clearance brought about by the mucus transport and bronchial clearance brought about by pulmonary macrophages. The effects on these mechanisms after exposure to environmental agents indicate that a deficiency in either of the mechanisms will lead to conditions favorable for the development of disease. The experimental models discussed are studies on bacteria deposited in the airways, studies on effects of bacteria deposited in the airways, and alterations of normal nasal-oral or lung flora.

16199 APTIC NO. 33887

Saccomanno, Geno, Richard P. Saunders, Victor E. Archer, Oscar Auerbach, and Lola Brennan

METAPLASIA AND NEOPLASIA. *National Cancer Inst., Bethesda, Md. and Atomic Energy Commission, Washington, D. C., Proc. Conf. Morphol. Exptl. Respirat. Car-*

cinogenesis, Gatlinburg, Tenn., 1970, p. 63-80. 11 refs. (May 13a16.)

NTIS: CONF-700501

A histological study of the tracheobronchial tree and sputum cells of six cases of cancer of the lung is presented. These six patients are divided into three groups according to toxic inhalant exposure. Two patients had long exposure to radon in uranium mines, two had long-term exposure to radon plus cigarette smoke, and two were long-time heavy cigarette smokers. All developed cancer of the lung. An attempt was made to match cells found in sputum prior to the time of surgery or death with sections showing similar cell patterns. Also, an attempt was made to correlate or show relationships of types of metaplasia seen in each group and to correlate this with final tumor product. The metaplasia seen in the patients exposed to cigarette smoke and radon are similar, and the tumorous final product is preceded by a histologically related metaplastic cell development. (Author abstract)

16200 APTIC NO. 33561

Sadilova, M. S., E. G. Plotko, L. N. El nichnykh, and K. P. Selyankina

TOXICOLOGICAL CHARACTERISTICS OF HYDROGEN FLUORIDE DURING CONTINUOUS INHALATION BY ANIMALS. *(Toksikologicheskaya kharakteristika ftoristogo vodoroda pri kruglosutochnoy ingalatsioynoy zatravke zhivotnykh). Text in Russian. Scientific Research Inst. for Occupational Health and Occupational Diseases, Sverdlovsk (USSR), Flyuoroz Ego Profil., Mater. Simp., 1966, p. 105-12.*

Hydrogen fluoride a 0.03-0.1 mg/sq m concentration had a toxic effect during a continuous five-month intoxication of experimental animals. It caused changes in functional condition of central nervous system of the animals and changes in their motoric chronaxy. Along with this, the accumulation of fluorine in teeth and bone tissue and development of specific diseases of teeth and bone tissue were observed. Concentration of 0.01 mg/sq m caused only changes in phosphorus-calcium exchange, observed by isotopic indication. This concentration is therefore considered threshold. The average daily maximum permissible HF concentration in the atmosphere of inhabited areas is suggested to be equal to 0.005 mg/sq m.

16201 APTIC NO. 34152

Said, Sami I.

PULMONARY RESPONSES TO INHALED PARTICLES. *Arch. Internal Med., 126(3):475-476, Sept. 1970. 18 refs. (Presented at the Workshop on Pulmonary Responses to Inhaled Materials: An Evaluation of Model Systems, Castle Harbour, Bermuda, Oct. 24, 1969.)*

Many vasoactive substances are removed or altered during passage through the lung. It is reasonable to speculate that impairment of this function of the lung by cell injury, such as may result from inhaled irritants, could be a factor in the initiation or aggravation of acute and chronic pathologic responses in the lung. Among the biologically active compounds which are concentrated in the lung are histamine, various prostaglandins, a systemic vasodilator peptide, and a kallikrein. The cellular localization of the metabolic processes involving these and other substances is still undetermined. The active sites probably include mast cells, but other cells in the alveolar wall may be involved. Pulmonary responses may include pulmonary arterial and venoconstriction, bronchial and alveolar-dust constriction, systemic vasodilation, and increased capillary permeability.

16202 APTIC NO. 34045

Sano, Tatsuo

TEN YEARS OF STUDIES ON PNEUMOCONIOSIS. *(Jinhai kenkyu no ju-nen). Text in Japanese. Rodo Kagaku (J. Sci. Labour, Tokyo), 47(10):571-574, 1971.*

For the past ten years, studies have been made on fibriosis, necrosis of lungs, bronchial transformation, isolated and aggregated dust accumulations, emphysema, apneumatosis and vein transformation. Types of pneumoconiosis such as lymphatic, alveolar, pure alveolar with intense necrosis, less intense necrosis, bronchiole alveolar, and combined types are reviewed with regard to causes, alveolar transformation, and characteristics. Maximum permissible dust concentration in working environments is two mg/cu m for dusts like talc, pagodite, aluminum, alumina, diatomaceous earth, sulfuric metals, asbestos, and dust containing more than 30% of free silicic acids; five mg/cu m for dust containing less than 30% of free silicic acid, oxidized iron, graphite, carbon black, coal, and active carbon. For other dust materials, maximum permissible concentration is 10 gm/cu m. Among organic dusts, pneumoconiosis of cotton, flax, hemp, grain shells, cane, cork, palm, felt, tree barks and leaves, flour, have been reported. The relationships between asbestosis and lung cancer and silicosis and lung cancer are briefly mentioned. Other cases of lung cancer have been found in pneumoconisis caused by alumina, activated carbon, graphite, pagodite, and welding of metals.

16203 APTIC NO. 33[illegible]78

Schlipkoeter, Hans-Werner

MAN S BURDEN THROUGH AIR POLLUTION DUE TO MOTOR EXHAUST EMISSIONS. *(Die Belastung des Menschen durch Luftverunreinigungen von Kraftfahrzeugen). Text in German. Staedtehygiene (Uelzen/Hamburg), 22(10):227-231, Oct. 1971. 28 refs.*

Air pollution from automobile exhaust emissions are due to incomplete combustion processes. The accumulation of dusts and aerosols in body tissues are primarily influenced by meteorological factors. Disturbances of vertical atmospheric exchange during low level inversions may lead to high accumulations of pollutants in the ambient air, resulting in acute illness. Persons subjected to vehicular emissions during traffic conditions may have blood levels of about two percent carboxyhemoglobin. Behavioral studies using test parameters of experimental psychology have demonstrated performance decrements even at low COHb-levels. Benzo(a)pyrene and lead compounds may be absorbed with a prolonged and intensified retention of particulate matter in the lung. The metablism and effects of aromatic polycyclic hydrocarbons and inhaled lead compounds are of primary importance in evaluating vehicular emissions. (Author abstract modified)

16204 APTIC NO. 34148

Schlipkoeter, H. W.

THE EFFECT OF AIR POLLUTION ON HUMAN HEALTH. REPORT ON THE PRESENT STATUS OF RESEARCH. *(Wirkung von Luftverunreinigungen auf die menschliche Gesundheit. Bericht ueber den Gegenwaertigen Stand der Forschung). Text in German. Ministerium fuer Arbeit, Gesundheit, und Soziales des Landes Nordrhein-Westfalen, Duesseldorf (West Germany), 20p., 1970. 18 refs.*

Fine atmospheric suspended dust reduces ultraviolet radiation and thus reduces its ability to destroy carcinogenic substances and to stimulate synthesis of vitamin D in the human body. Fine dust can itself contain carcinogenic 3,4-benzopyrene and can adsorb chemical substances from the atmosphere and transport them into the lungs. An accumulation of fine dust in the atmosphere can therefore lead to acute impairment of health, as proven by increased mortality during smog episodes (1952, 1962). Measurements have shown that fine particulates increased in concentration in the Ruhr region the 1965-1969 period. A comparison of two groups of children, one living in the polluted atmosphere of Gelsenkirchen and the other in the unpolluted atmosphere of Westerland/Sylt, showed retarded bone maturation, especially in the Gelsenkirchen girls. Whether this is attributable to the tenfold concentration of

SO2 and H2SO4 in Gelsenkirchen or to the climate has not been determined. In another study, persons exposed to low concentrations of dichloromethane manifested a considerably reduced ability to concentrate compared with a control group. Some noxious substances like derivatives of ethyleneimines cause genetic damage by increasing the spontaneous rate of mutation, considerably exceeding such damage caused by radiation. Such substances causes chromosomal damage at concentrations far below their toxic threshold concentrations.

16205 APTIC NO. 34149

Sellick, Hilary and J. G. Widdicombe

ACTIVITY OF LUNG IRRITANT RECEPTORS CAUSED BY CIGARETTE SMOKE, DUST AND HISTAMINE AEROSOL. *J. Physiol. (London), 210(1):56P-57P, Sept. 1970. 8 refs.*

The responses to cigarette smoke, dust, and histamine aerosol were studied in rabbits anesthetized with pentobarbitone and bilaterally vagotomized. Tracheal cannulae were inserted. Total lung resistance and compliance were measured by the subtractor method. Breathing, blood pressure, and arterial oxygen and carbon dioxide pressure were also measured. Action potentials were recorded from single vagal fibers from lung irritant receptors. Cigarette smoke increased impulse frequency of 11 of 12 tests on 8 receptors. Carbon dust stimulated 11 receptors in 10 of 13 tests. There were no significant changes in the other variables measured. An aerosol of 5% histamine acid phosphate stimulated 4 of 9 receptors and also increased total lung resistance and reduced compliance. Results indicate that the vagal reflex hypernoea and bronchoconstriction due to inhalation of cigarette smoke, inert dust, and histamine aerosol are due to stimulation of lung irritant receptors.

16206 APTIC NO. 33691

Shalamberidze, O. P. and N. T. Tsereteli

EFFECT OF SMALL CONCENTRATIONS OF SULFUROUS GAS AND NITROGEN DIOXIDE ON THE ESTRUAL CYCLE AND THE GENITAL FUNCTION OF ANIMALS IN EXPERIMENTS. *Text in Russian. Gigiena i Sanit. (Moscow), 36(8):13-17, 1971. 7 refs.*

Data are presented on the effect of small concentrations of sulfur dioxide, nitrogen dioxide, and a mixture of both on the estrual cycle and the genital functions of albino rats. An exposure period of three months to 4.97 mg/cu m SO2, 2.36 mg/cu m NO2, and a consecutive mixture of 2.25 and 1.20 mg/cu m of these gases caused disturbances of the estrual cycle and the genital function. Maximum permissible concentrations of these gases in the atmosphere are considered in relation to concentrations which affect the estrual cycle and genital function. (Author abstract modified)

16207 APTIC NO. 33988

Sklensky, Boshuslav and Vitezslav Horn

THE EFFECT OF AG 4 DUST (PHENOLFORMALDEHYDE RESIN WITH GLASS FIBER) UPON RAT LUNG. *(Ucinek prachu hmoty AG 4 (fenolformaldeydove pryskyrice se sklenenym vlaknem) na plice krys). Text in Czech. Pracovni Lekar. (Prague), 23(7):230-232, 1971. 10 refs.*

The effect of dust released in the processing of products made of mass AG 4 (40% phenol formaldehyde resin and 60% glass fiber) on laboratory rats was investigated. The dust was intratracheally injected at 75 mg/rat. After 11 months, only a negligible amount of small glass fiber fractions was determined in the lung; the predominant part of the dust was eliminated. Lighter inflammatory changes in some bronchi appeared as the sequel of mechanical irritation. The glass fiber produced by melting quartz did not induce formation of collagen tissue. In a group of 24 persons exposed to the effects of mass AG 4 dust, some subjective symptoms upon the skin and mucosa of the respiratory pathways was determined, but without signs of damage. Light hyperaemia of conjuctiva was established in eight subjects.

16208 APTIC NO. 33982

Smith, Roger P.

SPECTROPHOTOMETRIC DETERMINATION OF METHEMOGLOBIN AND OXYHEMOGLOBIN IN THE PRESENCE OF METHYLENE BLUE. *Clin. Toxicol., 4(2):273-285, June 1971. 19 refs.*

The influence of 1-300 micromoles methylene blue on the spectrophotometric determinations of human methemoglobin and oxyhemoglobin was examined. When methemoglobin generated by ferricyanide in fresh human lysates was equated with the decrease in absorbance at 620-635 millimicron after the addition of cyanide, all concentrations of methylene blue tested led to significant overestimations of the methemoglobin level. With oxyhemoglobin, the presence of methylene blue led to significant analytical errors. Detergents improved the accuracy of spectrophotometric determinations with fresh human lysates but did not eliminate errors altogether. Method of operation and experimental results are included. (Author summary modified)

16209 APTIC NO. 33473

Sorokin, Sergei P.

THE CELLS OF THE LUNGS. *National Cancer Inst., Bethesda, Md., and Atomic Energy Commission, Washington, D. C., Proc. Conf. Morphol. Exptl. Respirat. Carcinogenesis, Gatlinburg, Tenn., 1970, p. 3-43. 78 refs. (May 13-16.)*

Over 40 distinctive cell types make up pulmonary tissues. Most of these occur in other tissues of the body, but a few are unique to the lungs. Pulmonary epithelium is derived from pharyngeal endoderm, and this heritage constitutes a common bond among all lining cells from trachea to alveoli. During development, the endodermal epithelium becomes divisible into two segments, an upper, laryngobronchial epithelium and a lower, bronchiolo-alveolar lining. Differentiation only serves to strengthen the differences between the segments. Histochemical studies on mature lungs have shown that metabolic divesity is greatest in the epithelium tissues, but patterns of enzymic activity generally are similar in both segments. Ultrastructural studies tend to emphasize the distinctiveness of the two epithelial divisions; they show that uniquely pulmonary epithelial cells occur in the bronchioloalveolar lining. Both segments have a number of cell types in common, and among these at least two have close associations with pulmonary nerves. Among tissues derived from embryonic mesoderm, the blood vessels possess the greatest cellular and metabolic diversity. The illustrations show some of the cellular variety to be found in the lungs. A brief discussion of the origins of pulmonary tumors is included. (Author abstract modified)

16210 APTIC NO. 34066

Stankovic, Milos K.

BIOCHEMICAL TESTS FOR THE APPRAISAL OF EXPOSURE TO LEAD. *Arch. Environ. Health, vol. 23:265-269, Oct. 1971. 17 refs. (Presented at the Conference on Inorganic Lead, Amsterdam, Netherlands, Nov. 29, 1968.)*

Increases in the rate of the excretion of delta-aminolevulinic acid and, to a slightly lesser extent, increase in the excretion of coproporphyrin, in the urine of persons subjected to occupational exposure to lead, parallel the increase in the excretion of lead in the urine (and the concentration of lead in the blood). Data derived from a study of groups of workmen subjected to varying degrees of exposure have been assembled to demonstrate the gradation of these several responses to graduated occupational exposure to lead, and to provide collective criteria for the establishment of threshold limits. (Author abstract)

16211 APTIC NO. 33961

Stepanov, S. A.

COMPARATIVE ASSESSMENT OF THE RESULTS OF TESTS CONDUCTED TO STUDY THE EFFECT OF VARIOUS KINDS OF FRACTIONS OF CEREAL DUST ON THE RESPIRATORY ORGANS IN ANIMALS. *(Sravnitelnaya otsenna resultatov opytov po izucheniyu vliyaniya razlichhykh vidov i fraktsiy zernovoy pyli na organy dykhanya zhivotnykh). Text in Russian. Gigiena Truda i Prof. Zabolevaniya, 15(8):44-45, Aug. 1971.*

To get an insight into the occupational hazards of farm workers involved in the harvesting, processing, and loading of seed cultures, experiments on animals were performed. Twelve series of experiments included animals subjected to single or double dose (50 mg dust in one ml physiological solution), intratracheal treatment or to the inhalation of seed dust, elevator dust, or soil dust. The animals were killed after one, three, six, 10, 15, and 30 days or after two, four, six, nine, 12, or 18 months following exposure to the pathogenic dust agent. The silicon dioxide levels constituted 8.0-14%, 10-18%, 0.08-1.0%, 13 to 18% and 12 to 24% in the elevator seed dust, the ground current, the vegetal fraction, the mineral fraction and the soil dust, respectively. The role of free SiO_2 in the pathogenesis of fibroplastic processes is pinpointed following intratracheal administration of the 13-18% SiO_2 containing mineral fraction of seed dust. These pneumoconioses elicited a slowly progressive character. Irregular thickening of the interalveolar barriers, development of proliferative and sclerotic granulomas in the lung indicated the mixed diffusive and nodulary character of pneumoconiosis induced by seed dusts. The severeness of lung alterations was determined by the secondary destructive alterations occurring within the bronchi with the development of structural alterations of the pulmonary parenchyma leading to fibrosis. The morphological alterations of the lung induced by seed dust carry a specific character and should be distinguished from the sclerotic processes occurring in silicosis or other pneumoconioses.

16212 APTIC NO. 33860

Stewart, Harold L., Thelma B. Dunn, and Katharine C. Snell

PATHOLOGY OF TUMORS AND NONNEOPLASTIC PROLIFERATIVE LESIONS OF THE LUNGS OF MICE. *National Cancer Inst., Bethesda, Md. and Atomic Energy Commission, Washington, D. C. Proc. Conf. Morphol. Exptl. Respirat. Carcinogenesis, Gatlinburg, Tenn., 1970, p. 161-184. 64 refs. (May 13-16.)*

NTIS: CONF-700501

The common pulmonary tumor of the mouse, the alveologenic carcinoma, is described, including its morphological features, metastases, histogenesis, transplantability, and some methods for its induction. The views of early observers who noted this tumor are also mentioned. Other neoplasms described are hemangioendotheliomas and squamous cell carcinomas. The point is made that not all lesions reported in published papers as squamous cell carcinoma are genuine neoplasmas. Some were evidently lesions of squamous metaplasia which were misdiagnosed as carcinoma. The nonneoplastic proliferative lesions of squamous metaplasia and adenomatosis as well as those induced by SE polyoma virus are described. Features for the differential diagnosis of squamous cell metaplasia from squamous cell carcinoma and adenomatosis from alveologenic carcinoma are described. (Author abstract)

16213 APTIC NO. 33484

Stokinger, Herbert E., George F. Sprague, Robert H. Hall, Norman J. Ashenburg, James K. Scott, and L. T. Steadman

ACUTE INHALATION TOXICITY OF BERYLLIUM. I. FOUR DEFINITIVE STUDIES OF BERYLLIUM SULFATE AT EXPOSURE CONCENTRATIONS OF 100, 50, 10 AND 1 MG. PER CUBIC METER. *Arch. Ind. Hyg. Occupational Med., 1(4):379-397, April 1950. 20 refs.*

The acute response that occurs on inhalation of beryllium compounds in laboratory animals is reported. The toxicity of beryllium sulfate mist was determined in four inhalation exposure studies using concentrations of 100 and 1 mg beryllium sulfate/cu m air. Repeated daily six-hour exposures were lethal to the 11 species tested at concentrations of 50 mg/cu m and above. A red cell anemia occurred if the exposures were prolonged sufficiently, characterized by a decrease in erythrocyte count and hemoglobin concentration and an increase in mean corpuscle volume. Ten variables were tested in the blood and urine; five of these, namely, urinary protein, serum albumin, globulin, and the phospholipid and cholesterol of red blood cells, showed positive correlations with progressive exposure to beryllium. All cellular responses at all levels of exposure were confined to the lung. On prolonged exposure, the response closely resembled that seen in acute human beryllium poisoning. High levels of exposure, 47 and 100 mg/cu m, produced acute pulmonary lesions. The 1-mg study indicated that the characteristics of acute beryllium poisoning are anemia, changes in red blood cell lipids, changes in the amounts of serum proteins which indicate a change in nitrogen metabolism, changes in arterial oxygen tension, and acute inflammatory response in the lung.

16214 APTIC NO. 33505

Stokinger, Herbert E., Charles J. Spiegl, Robert E. Root, Robert H. Hall, Luville T. Steadman, Catherine A. Stroud, James K. Scott, Frank A. Smith, and Dwight E. Gardner

ACUTE INHALATION TOXICITY OF BERYLLIUM. IV. BERYLLIUM FLUORIDE AT EXPOSURE CONCENTRATIONS OF ONE AND TEN MILLIGRAMS PER CUBIC METER. *Arch. Ind. Hyg. Occupational Med., 8(6):493-506, Dec. 1953. 23 refs.*

Pulmonary lesions were produced in animals exposed to beryllium fluoride mist at concentrations of 10 and 1 mg/cu m. These closely resemble the lung changes resulting from inhalation of beryllium sulfate. Beryllium fluoride is acutely more toxic than beryllium sulfate. Exposure to 1 mg BeF_2/cu m resulted in lung damage in cats, rabbits, and rats comparable in extent and degree to that produced by 10 mg of beryllium sulfate mist/cu m. Macrocytic anemia occurred in dogs and rabbits exposed to 1 mg BeF_2/cu m. The anemia was more severe than that observed after inhalation of beryllium oxide dust or beryllium sulfate mist. Urinary uric acid excretion can possibly serve as an index of the degree of exposure to beryllium. Beryllium tended to accumulate in the lungs, pulmonary lymph nodes, liver, skeleton, and bone marrow of dogs. The deposition rate in the lungs and lymph nodes increased with the duration of exposure. A greater proportion was distributed to the skeleton, liver, spleen, and kidney after inhalation of BeF_2 than occurred with beryllium oxide dust or beryllium sulfate mist in earlier studies. (Author summary modified)

16215 APTIC NO. 33374

Stopps, G. J.

IS THERE A SAFE LEVEL OF LEAD EXPOSURE? J. Wash. Acad. Sci., 61(2):103-109, 1971.

The history of lead exposure and human health is traced through three stages: learning about the biological effects of lead; recognition of the clinical picture without association with causative agent; and correlation of the effects with diseases and illnesses. Gases of plumbism among battery workers, deaths from cerebral hemorrhage, thrombosis, and arteriosclerosis according to grades of exposure, effects of exposure to lead arsenate used an an insecticide, and experiments conducted on dogs are reviewed. The effect of lead on enzymes, which could result in anemia when the level of lead in the blood reaches 110 micrograms/100 g of blood, is examined. Lead poisoning in children is discussed.

16216 APTIC NO. 33702

Tateishi, Yoji

CONTROL OF RECOGNIZED PATIENTS BY THE ENVIRONMENTAL POLLUTION RELIEF LAW FOR DISEASE ASSOCIATED WITH AIR POLLUTION BY YOKKAICHI CITY. *(Yokkaichi shi no nintei suru taiki osen kankei kanren shikkan nintei kanja no kanri). Text in Japanese. In: A Study of the Administration Method of Medical Care for Sufferers from Public Nuisance in Yokkaichi City. Committee of Mie Prefectural Medical Insurance on Public Nuisance (Japan), p. 67-82, March 1970.*

Patients with illnesses due to air pollution in Yokkaichi were examined for 1969. A total of 490 cases, including 142 new cases recognized under the Environmental Pollution Relief Law, were investigated. The new cases were classified according to sex, region, and diseases. Pulmonary function tests, chest x-rays, and electrocardiograms designated a trend that was almost identical with that of the previous year. In the initial stage, the regional distribution of the junior high school age classification was almost limited to Shiohama district, with a later tendency to even distribution over the entire city. Based on questionnaires, patients who moved out of the city recovered. Four of the eight patients who did not survive had a cancerous disease.

16217 APTIC NO. 33868

Tejning, Stig

THE PROBLEM OF MERCURY IN SWEDEN. *(Kvicksilverfragen i Sverige). Preprint, Swedish Dept. of Agriculture, 1965, p. 80-91. Translated from Swedish. Scientific Translation Service, Santa Barbara, Calif., 19p. (Presented at the Swedish Department Agriculture, Conference on Mercury, 1965.)*

The effects of metallic quicksilver, an inorganic mercury salt, and the alkyl mercury compounds are compared. In 1953, cases of a mysterious nervous disease began to appear among the population of the city of Minamata, Japan. The suspicion that it could be alkyl mercury poisoning was confirmed when the patients were found to be excreting mercury in their urine for the first five months after becoming ill. Further investigation revealed that a chemical plant which used mercury compounds as catalysts had released waste products into the Minamata Bay, and several types of fish subsequently were found to have a high mercury content. Feeding experiments were conducted with six month old white leghorn hens which were given 12.5, 25, and 50% Panogen treated grain. In the groups whose feed contained 25 and 50% Panogen, both food consumption and egg production decreased. Alkyl mercury poisoning in wild pheasants is also discussed.

16218 APTIC NO. 33610

Terajima, H., T. Tojo, K. Kokei, T. Torii, Tatsuya Nakamura, Teruo Nakamura, T. Nagase, N. Niizu, N. Nishino, K. Nozaki, and M. Hara

AIR POLLUTION IN THE UNDERGROUND PARKING AREA WITH THE EXHAUST GAS OF MOTOR CARS AND THE EFFECTS ON THE HEALTH OF WORKERS. *(Chika chushajo ni okeru jodosha haiki gasu ni yoru kuji osen to sagyoin e no eikyo). Text in Japanese. Nichidai Igaku Zasshi (Nippon Univ. Med. J.), 29(8),753-756, Aug. 1970.*

Two underground parking areas in Tokyo were investigated with respect to average daily business, ventilation, temperature, humidity, fluorescent lighting and, concentrations of dust, carbon dioxide, and carbon monoxide. The results were correlated with health examinations and tests administered to the workers. The average ages of the workers ranged from 35 at parking area I to 50 at area II. The case histories revealed only one case of bronchitis requiring treatment. All the older workers had high blood pressure. Subjective symptoms of respiratory diseases, including coughing, mucous discharge, and choking were reported in 50% of the cases. Permanent fatigue was minimal, but complaints of eye irritation, heavy heads, dry mouth, and forgetfulness were prevalent and indicated chronic CO poisoning. The influences of sulfur dioxide, formaldehyde, nitrogen oxides, and lead were not determined.

16219 APTIC NO. 33837

Tomingas, R., H. U. Lange, E. G. Beck, N. Manojlovic, and W. Dehnen

THE ELUTION OF BENZO(A)PYRENE ADSORBED ON PARTICULATES BY MACROPHAGES CULTURED IN VITRO. *(Die Abloesung von an Staub adsorbiertem Benzo(a)pyren durch in vitro gezuechtete Makrophagen). Text in German. Zentralbl. Bakteriol., Parasitenk. Infektionskr. Hyg.: Abt. I: Orig., Reihe B, vol. 155:148-158, 1971. 7 refs.*

Experiments were undertaken to determine whether the macrophages were able to elute benzo(a)pyrene from supporting materials. Benzo(a)pyrene when inhaled into the lungs is regularly absorbed on particles. Carbon blacks and furnace dust were extracted first with benzene, dried, and then charged with benzo(a)pyrene. Macrophages were obtained from guinea pigs and cultured; incubation was carried out. Following incubation, the solids were separated from the medium and the benzo(a)pyrene was determined by means of fluorescence spectroscopy. Cytotoxicity was estimated by staining the cells with Erythrosin B, measuring of the lactic acid dehydrogenase-activity in the supernatant, and determining of lactate production. Alveolar as well as peritoneal macrophages were capable of eluting benzo(a)pyrene absorbed on carbon blacks and dusts but the elution rate was different. A relation between cytotoxicity and elution of benzo(a)pyrene was not evident. (Author abstract modified)

16220 APTIC NO. 33659

Tsukamoto, Hideyo

ADVISORY SERVICE FOR PATIENTS BY POLLUTION AND RESEARCH ON THEIR ACTUAL CONDITIONS AT A MEDICAL CENTER. *(Iryo senta ni okeru kogai kanja sodan to sono jittai chosa). Text in Japanese. In: A Study of the Administration Method of Medical Care for Sufferers from Public Nuisance in Yokkaichi City. Committee of Mie Prefectural Medical Insurance on Public Nuisance (Japan), p. 33-41, March 1970.*

Patients with illnesses due to air pollution were examined at a medical center in Yokkaichi City. The number of patients, mostly from the old sections of the city, declined considerably by 1969. The subjective symptoms of 86 patients who underwent closer examinations were: cough 92%; sputum - 80%; asthmatic attacks 76%; shortness of breath - 60%; smoking - 31%; coughs persisting for over three years 50%; sputum persisting for over three years 40%. A majority of the patients who were not examined more closely exhibited obvious otorhinological symptoms.

16221 APTIC NO. 33701

Tsukamoto, Hideyo

THE HEALTH EXAMINATION OF INHABITANTS IN THE DISTRICT OF TOMIDA WHICH IS REGARDED AS NON-POLLUTED DISTRICT OF THE CITY OF YOKKAICHI. (PART 2). *(Yokkaichi shinai ni okeru hiosen chiku to kangae rareru Tomida chiku ni okeru jumin kenshin seiseki. (Dai 2 ho)). Text in Japanese. In: A Study of the Administration Method of Medical Care for Sufferers From Public Nuisance in Yokkaichi City. Committee of Mie Prefectural Medical Insurance on Public Nuisance (Japan), p. 89-103, March 1970.*

The health of inhabitants of the Tomida district, a non-polluted area of Yokkaichi City, was examined for December 1968 January 1969 and December 1969 January 1970. The investigative methods included questionnaires, blood and urine tests, chest X-rays, pulmonary function examinations, allergic intracutaneous reaction tests, blood pressure determination, and electrocardiograms. The results of the investigation are tabulated.

16222 APTIC NO. 33721

Tsukamoto, Hideyo, Mitsuru Iwakuru, and Junzo Shirai

RESULTS OF THE DETAILED EXAMINATION OF THE RESPIRATORY ORGAN CONDUCTED AT THE MEDICAL CENTER OF THE MEDICAL ASSOCIATION. (REPORT 3). COMPARISON OF CASES WITH THE SO-CALLED YOKKAICHI ASTHMA WITH THOSE OF BRONCHIAL ASTHMA IN NAGOYA DISTRICT. *(Ishikai iryo senta ni oite jisshi shita kokyuki seimitsu kenshin seiseki. (Dai 3 po). Iwayuru Yokkaichi zensoku rei to Nagoya chiku no okeru kikanshizensoku shorei to no hikaku kenkyu). Text in Japanese. In: A Study of the Administration Method of Medical Care for Sufferers From Public Nuisance in Yokkaichi City. Committee of Mie Prefectural Medical Insurance on Public Nuisance (Japan), p. 105-120, March 1970.*

Patients with bronchial asthma and dyspnea accompanied by stridor were examined and the results compared for the districts of Nagoya and Yokkaichi. Age categories, backgrounds, case histories, clinical symptoms, allergic factors, and airway sensitivity were investigated. The majority of cases in Yokkaichi inhabited areas were affected by pollution and the onset of symptoms was correlated with air pollution. Aggravation fo symptoms was significantly more severe for June-August in the Yokkaichi district. More patients in Yokkaichi complained of increased cough and sputum annually. There were more cases of dyspnea above the III degree in the above-40 group in Yokkaichi. Approximately 60% of the cases in both districts exhibited airway sensitivity. The rate of sedimentation, white blood cell count, chest X-rays, and percent vital capacity were determined and compared.

16223 APTIC NO. 33981

Turnock, A. C., S. Bryks, and F. D. Bertalanffy

THE SYNTHESIS OF TRITIUM-LABELED ASBESTOS FOR USE IN BIOLOGICAL RESEARCH. *Environ. Res., 4(2):86-94, April 1971. 25 refs. (Presented at the Canadian Federation of Biological Societies.)*

Experiments were carried out to synthesize tritium-labeled chrysotile asbestos applicable to studies of its biological effect on respiratory tissue. Chrysotile asbestos was synthesized from periclase magnesium oxide, amorphous silicon dioxide, and tritiated water. The resulting material was well labeled but the shape of the particles was in part nonacicular. Natural chrysotile, maintained in the presence of tritiated water at 300 degrees for 20 days to produce an exchange of structural hydroxyls with tritium-oxyls, yielded well-labeled material with acicular shape particles. The labeled chrysotile dust was used to localize the material in lung tissue; clearance from the lung could be accurately quantified by scintillation counting. (Author abstract modified)

16224 APTIC NO. 33314

Valade, P. and E. Coste

TOXICITY OF ORGANIC LEAD SALTS. (EXPERIMENTAL STUDY). *(Toxicite de sels organiques de plomb (Etude experimentale)). Text in French. Arch. Mal. Prof. (Paris), 14(6):584-593, 1953. (Presented at the Societe de Medecine et d Hygiene du Travail, Oct. 19, 1953.)*

The toxicity of lead stearate and lead acetylsalicylate was studied in dogs and rabbits exposed to a concentration of 333 mg/cu m of the toxic substances in dust form in an enclosed chamber. The only clinical symptom observable was the marked loss of weight, most noticeably in dogs. No gastro-intestinal difficulties except anorexia were noted. Hematological tests included erythtocyte and leucocyte counts and hemoglobin determination. Hematological anomalies appeared principally in the form of nucleated and punctuated erythrocytes, not in a change of the corpuscle count. Severe hepatic and renal lesions appeared. The hepatic lesions were diagnosed as steatosis leading eventually to cirrhosis. The renal lesions were glomerular and tubular; pulmonary lesions were secondary. Inhalation of organic lead salts by humans present a danger of the development of hepatitis and of nephritis.

16225 APTIC NO. 33493

Webster, Ian

ASBESTOSIS. *S. African Med. J. Capetown, 38(2):870-872, Oct. 31, 1964. 21 refs. (Presented at the Congress of the South African Medical Association, 44th, Johannesburg, South Africa, July 1963.)*

Asbestosis cases found during a survey were diagnosed by radiological examination; even without any evidence of disability, the film showed the diffuse fibrosis or calcified pleural plaques o asbestosis. Cases of asbestosis were found in factories using asbestos and also in factories not using it in any process, but situated close to factories that did. The first change found in the lungs due to the inhalation of asbestos is an aggregation o dust-laden phagocytes in the region of the respiratory bronchioles and below the pleura. The dust which reaches the interstitial tissues causes an initial interstitial fibrosis in those regions. The fibrosis extends to the adjacent alveoli and associated alveolar ducts. The fibrosis involves more and more of the alveolar ducts and alveoli supplied by the respiratory bronchiole and eventually there is no normal alveolar bronchial tissue. Malignant disease may also occur in cases of asbestosis. The pneumoconiosis produced by the inhalation of asbestos dust still presents a large number of problems, mainly the particular property of the dust which causes fibrosis, the length of exposure (dust load) necessary to produce fibrosis, and the reason for the increased incidence of pulmonary malignancy in asbestosis.

16226 APTIC NO. 34076

Webster, W. S.

THE EFFECT OF CARBON MONOXIDE ON EXPERIMENTALLY-INDUCED ATHEROSCLEROSIS IN THE SQUIRREL MONKEY. *Preprint, American Medical Association, Chicago, Ill., 9p., 1970. 17 refs. (Presented at the Air Pollution Medical Research Conference, New Orleans, La., Oct. 5-7, 1970.)*

Monkeys fed cholesterol and exposed to carbon monoxide had evidence of a greater extent of cardiac abnormalities than did control cholesterol-fed monkeys. The greater severity of coronary arterial lesions in monkeys inhaling CO was demonstrated by the relative increases in heart weights, suggestive electrocardiographic changes, and a greater extent of stenosis of coronary arteries due to lipid. Greater quantities of intimal lipid per atherosclerotic coronary artery were more evident than numbers of coronary arteries with intimal lipid, in the monkeys exposed to CO. It is proposed that the arterial lipid lesions are induced by the cholesterol feeding and intensified by the animal s exposure to CO. (Author summary)

16227 APTIC NO. 33847

Wettig, K.

RECENT FINDINGS CONCERNING THE CARCINOGENIC ACTIVITY OF POLYCYLIC HYDROCARBONS IN THE BIOSPHERE. *(Neuere Anschauungen ueber die kanzerogene Aktivitaet von polyzyklischen Kohlenwasserstoffen in der Biosphaere). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 17(9):667-670, Sept. 1971. 13 refs.*

No direct relationship exists between the concentration of polycyclic hydrocarbons in the ambient air and the biologically active concentration, since the fraction of hydrocarbons in the various particle size classes fluctuate widely. It depends on the type of fuel, on the meteorological conditions, and on the residence time in the atmosphere. Due to the physical structure of the hydrocarbons, they are not easily soluble in the aqueous phase of the human organism. Solubility and separation of the hydrocarbons from the carrier particle depends on the structure and quality of the carrier particle. The residence time in the organism also plays a decisive role. After deposition of the hydrocarbon-containing particles in the respiratory tract and after separation from the carrier particles, they act on the tissue until they are transported away or decomposed. The extent of the effect depends on the type and quantity of individual hydrocarbons in the complex mixture and on other, still unknown, components of the atmospheric air. An evaluation of the benzo(3,4)pyrene content on busy traffic intersections in Berlin revealed that a non-smoker inhales as much benzo(3,4)pyrene per day as a smoker who smokes 25 to 30 cigarettes daily. It is not known, however, if the benzo(3,4)pyrene inhaled with the air has the same effect as that inhaled with cigarette smoke. Cancer occurs more frequently in benzo(3,4)pyrene polluted areas than in those with no such pollution. It is not known, however, whether these pollutants just prepare the organism for a virus attack or whether they are the actual carcinogenic substance.

16228 APTIC NO. 33559

Winkelstein, Warren, Jr. and Michael L. Gay

ARTERIOSCLEROTIC HEART DISEASE AND CEREBROVASCULAR DISEASE: FURTHER OBSERVATIONS ON THE RELATIONSHIP OF SUSPENDED PARTICULATE AIR POLLUTION AND MORTALITY IN THE ERIE COUNTY AIR POLLUTION STUDY.

Inst. of Environmental Sciences, Mt. Prospect, Ill., Inst. Environ. Sci., Tech. Meet., Proc., 16th Boston, Mass., 1970, p. 441-446. 8 refs. (April 12-16.)

Mortality rates from arteriosclerotic heart and cerebrovascular diseases among white males and females, 50 years of age and older, in the Buffalo area (Erie County), were classified according to economic and suspended-particulate air pollution levels. Death rates from arteriosclerotic heart disease among men showed an inverse association with economic class and a direct association with air pollution. Within each economic class among men 50-69, there as a consistent gradient from the lowest air pollution level to the highest, except in the highest economic class. Among those 70 years and older, the gradients were less regular. Nevertheless, for this age group in the $5175-$6004 income bracket, the mortality rate in the highest pollution area was 70% higher than in the lowest. Trends among women were closely similar, although their death rates from arteriosclerotic heart disease were substantially lower. In the case of mortality from cerebrovascular heart disease, the inverse association with economic class was evident in each age and sex group, but less consistently demonstrated. The direct relationship with air pollution was also present.

16229 APTIC NO. 33825

Wood, W., J. Gabica, H. W. Brown, M. Watson, and W. W. Benson

IMPLICATION OF ORGANOPHOSPHATE PESTICIDE POISONING IN THE PLANE CRASH OF A DUSTER PILOT.

Aerospace Med., 42(10):1111-1113, Oct. 1971. 4 refs.

When considering direct human vulnerability to pesticides, one important category of highly exposed persons that deserves considerable attention is that of aerial spray pilots. A 34-year-old white male duster pilot with ten years flying experience and six years aerial application experience, crashed a Piper Pawnee 235 aircraft while executing a routine landing maneuver. The subject's abrupt and dramatic drop in cholinesterase activity at the time of the crash and for several days thereafter, provides the strongest evidence that organophosphate poisoning did indeed occur. This premise is strengthened by his known chronic exposure, subsequent symptomatology following the crash, successful treatment with atropine and pralidoxime, and an aberrant electroencephalogram. Neurophysiological significance of organophosphate intoxication is discussed.

16230 APTIC NO. 33893

Woolf, C. R.

AN ASSESSMENT OF THE FRACTIONAL CARBON MONOXIDE UPTAKE AND ITS RELATIONSHIP TO PULMONARY DIFFUSING CAPACITY.

Diseases Chest, vol. 46:181-189, Aug. 1964. 6 refs.

The fractional carbon monoxide uptake (FUco) which is the percentage of inspired CO absorbed in the lungs, and the pulmonary diffusing capacity (Dco) are both measurements of gas exchange; both are influenced by minute volume, the state of the alveolar capillary membrane; and by ventilation-perfusion relationships. Both parameters were measured in 48 normal subjects at rest and during exercise. Measurements at rest were made in 64 patients with chronic chest disease and in 35 of these the tests were repeated during exercise. A modification of the Bates steady-state technique for estimating diffusing capacity is described. FUco showed no significant differences between men and women and there was no relationship to body surface area. There was a decrease with increasing age, but this relationship was not present when it was measured during exercise. The normal FUco had a narrower range than the Dco and was relatively little affected by voluntary hyperventilation. FUco at rest and during exercise in the same individual agreed well whether the result was normal or abnormal. A normal FUco corresponded with a normal Dco, and a low Dco was always associated with a low FUco. Where the FUco was low and the Dco was normal, evidence suggests that the former revealed an abnormality of exchange not shown by Dco. (Author summary modified)

16231 APTIC NO. 33870

Wysocki, Miroslaw and Wladyslawa Maternowska

CHRONIC NONSPECIFIC RESPIRATORY DISEASES IN CRACOW. XII. EVALUATION OF MEASUREMENTS OF PULMONARY VITAL CAPACITY AND OF THE RADIOPLANIMETRIC INDEX IN THE DIAGNOSIS OF CHRONIC BRONCHITIS.

Epidemiol. Rev. (English translation from Polish of: Przeglad Epidemiol., 24(2):129-134, 1970. 4 refs.

NTIS: TT 70-55001/2

Results of vital capacity and radioplanimetric measurements made during a pilot study in one of the districts of Krakow were analyzed according to sex, age groups, and chronic bronchitis syndrome in order to test their usefulness in epidemiologic diagnosis. The clinical measurements included body weight and height and chest roentgenograms made during maximum inspiration and expiration. In the healthy and chronic bronchitis syndrome groups, vital capacity (VC) was correlated with age and body height. The correlation between VC and age was negative, and between VC and body height positive. In both cases the coefficients of regression differed significantly from zero. The results of the radioplanimetric measurements were analyzed separately for the healthy and chronic bronchitis syndrome groups, taking age into account. In healthy men and women, the value of the radioplanimetric index increased with age, and the regression coefficients differed significantly from zero. In the chronic bronchitis syndrome groups, the observed increase of the value of the radioplanimetric index with age was statistically nonsignificant. To a certain extent, the values of VC and the radioplanimetric index were interdependent: the radioplanimetric index increased as VC decreased.

16232 APTIC NO. 33972

Yamagiwa, Hiroshi, Nobuyoshi Kunishima, and Hideo Kashiwagi

ON THE AUTOPSY CASES OF BRONCHIAL ASTHMA AT YOKKAICHI AIR-POLLUTED DISTRICT. *(Yokkaichi taikiosen chiiki ni okeru zensokurei no boken shoken (5 shorei)). Text in Japanese. Naika, 28(3)575-583, Sept. 1971. 9 refs.*

Laboratory findings, autopsy findings, and gross findings in necropsied cases were used to study bronchial asthma affected by air pollution. Four men, aged 67, 73, 75, and 77 years old, and a 54 year old woman from highly polluted residential areas of Yokkaichi were studied. Two men smoked 30 cigarettes/day. Symptoms included asthmatic attacks, bronchial asthma, anthracosis in the lung, and bleb and bulla in the lung. Hyperplasia of mucous cells, muciparous glands in the airway epithelium, hypertrophy of basement membranes, and muscular layers were recognized. Other cell and tissue changes occurred in the bronchi, lungs, lymph, and plasma. Enlargement and dilation of the heart was also found. Liver cell degeneration, exudative gastritis, atrophy of the adrenal gland, and hypoplasia of the bone marrow were also found in some cases.

16233 APTIC NO. 34193

Yasojima, S.

INVESTIGATION OF EFFECTS OF AIR POLLUTION AS A LOCALIZED ACTIVITY OF A MEDICAL ASSOCIATION, ITS METHOD AND ADMINISTRATION. *(Ishikai no chiiki katsudo to shite no taiki osen no eikyo chosa, hoshiki narabi ni sono kanri hoshiki ni tsuite no kenkyu). Text in Japanese. Nippon Ishikai Zasshi (J. Japan Med. Assoc.), 60(3):252-273, Aug. 1968. 11 refs.*

The effects of air pollution on human health were studied in the Isoko district of Yokohama. Sulfur dioxide concentrations averaged from 0.75-1.17 mg/day/100 sq cm, with the highest values at 1.67 for February and the lowest at 0.30 in August 1967. Concentrations of settling particulates averaged at 7.7-8.8 tons/sq km/month, with the maximum at 13.4 in November and the minimum at 3.2 in August. Based on the results of questionnaires and tests on forced vital capacity, peak flow rate, chest X-rays, blood pressure, and urine composition, values for respiratory diseases were determined. Of the patients examined, 14.9% had bronchitis and 13.3% reported more than a week of respiratory diseases in the past three years. The values varied for men and women 40-70 years old. Other symptoms with relatively high values included coughing, mucous discharge, and shortness of breath.

16234 APTIC NO. 34211

Yokoyama, Eiji

OZONE EXPOSURE AND ITS INFLUENCE ON A LIVING BODY. *(Ozon bakuro no seitai eikyo). Text in Japanese. In: Studies on Formation of Hydrocarbon and Photochemical Reactive Material and Their Influences. Joint Team for the Study of Photochemical Reactions, Tokyo (Japan), p. 11-16, April 1970.*

The influence of ozone on the surfactants and surface tension of lungs was examined. Lung extracts and dipalmitoyl lecithin (DPL) from guinea pigs were exposed in vitro to ozone, and the surface tension was measured; the contraction or expansion of the test material was measured by potentiometer. The surface tension of the lung extract decreased with compression and increased with expansion of surface circumference. The hysteresis phenomenon was distinct. The higher tension showed little change; low tension increased with time and then stabilized. The average tensions determined where 44.0 plus or minus 4.4 dyne/cm maximum and 10.4 dyne/cm minimum. Exposure to more than 0.5 ppm of ozone increased the minimum tension rapidly; the higher the ozone concentration, the shorter the time required to reach maximum tension. The minimum DPL surface tension was less than 10 dyne/cm; exposure to ozone determined almost no change, possibly due to over-oxidation.

16235 APTIC NO. 33760

Zelac, R. E., H. L. Cromroy, W. E. Bolch, Jr., B. G. Dunavant, and H. A. Bevis

INHALED OZONE AS A MUTAGEN. 1. CHROMOSOME ABERRATIONS INDUCED IN CHINESE HAMSTER LYMPHOCYTES. *Environ. Res., 4(3):262-282, Aug. 1971. 117 refs.*

Female Chinese hamsters were exposed in two groups of four to 0.02 ppm ultraviolet-generated ozone for five hours and examined for chromosome abberations in circulating blood lymphocytes. Inhaled ozone produced 1.6 times 0.001 breaks/cell (ppm min), agreeing well with data from in vitro exposure of human cells. There was no apparent decrease in break frequency with time for two-week posttreatment. By extension, a human exposed for one week (40 hours) to the permitted 0.1 ppm ozone could have break frequencies orders of magnitude greater than those resulting from permitted radiation exposure. Since the chromosome aberrations are cellular alterations with long-term consequences, the lowering of community and industrial standards for ozone would be prudent. (Author abstract modified)

EFFECTS-PLANTS AND LIVESTOCK

16236 APTIC NO. 33362

Aronson, Arthur L.

BIOLOGIC EFFECTS OF LEAD IN DOMESTIC ANIMALS. *J. Wash. Acad. Sci., 61(2):110-113, 1971. 21 refs.*

Sources of lead and their effects on domestic animals are reviewed. A daily intake of six to seven mg/kg constitutes a minimum cumulative fatal dosage of lead for cattle, representing a concentration of approximately 300 ppm lead in the total diet. Horses grazing on pastures adjacent to a lead smelter were poisoned by eating hay containing 2.4 mg/kg/day of lead; the minimal toxic dose is 2 mg/kg/day. The horses, however, eat roots as well as forage, and the soil near the smelters contains more lead than the forage itself. Symptoms of lead poisoning include derangement of the central nervous system, gastrointestinal tract, muscular system, and hemopoietic system. The syndrome in cattle appears as depression, anorexia, colic, and maniacal excitement. Sheep exhibit depression, anorexia, abdominal pain, and diarrhea. Anemia is common during chronic ingestion. Horses knuckle at the fetlocks and have laryngeal paralysis. The effect of lead poisoning on the pregnant animal is discussed.

16237 APTIC NO. 34172

Belot, Y., J. Ridelle-Berger, and D. Gauthier

THE CAPTURE OF ATMOSPHERIC PARTICLES BY THE LEAVES OF PLANTS. WIND TUNNEL EXPERIMENTS. *(La captation des particules atmospheriques par les feuilles des plantes. Essais en soufflerie). Text in French. Commis. Energ. At., Bull. Inf. Sci. Tech., no. 151:9-14, Sept. 1970. 10 refs.*

An experimental study was conducted to determine the uptake by pine needles of uranium particles with an average diameter of 0.1 micron. The pine branch was introduced into a wind tunnel in which the test aerosol was circulated. Pickup velocities approached .04 cm sec-1. Horizontal plates had a much smaller pickup velocity. Thus, pine needles seem well suited to air cleaning and may also be used as control samples for pollution detection and analysis. (Author summary modified)

16238 APTIC NO. 33922

Bovay, Ernest

LEAD DEPOSITS ON VEGETATION ALONG HIGHWAYS. A STUDY OF FEEDING DAIRY FARM CATTLE HAY CONTAMINATED BY LEAD. *(Les depots de plomb sur la vegetation le long autoroutes. Essai d affouragement de vaches laitieres avec du foin souille par le plomb). Text in French. Bull. Eidgenoess Gesundheitsamtes, Beilage B, no. 3:169-186, March 1971. 36 refs.*

Investigations conducted in Switzerland from 1967 through 1970 showed that relatively high quantities of lead are deposited along heavily frequented roads and highways. Plants growing in the immediate vicinity of the road contained in excess of 100 ppm lead. Although lead concentrations decreased rapidly with distance from the road, lead pollution was sometimes distinctly perceptible 100 m or more from the road. The rate and extent of diffusion of lead particles depended on the prevailing seasonal, orographic, and/or meteorological conditions. Lead retention was influenced to a large extent by the nature and composition of different plant organs: plants with large, hairy leaves accumulated much more lead than plants with straight, erect, and/or smooth leaves. A thorough washing removed from 35-65% of the lead deposits, indicating the superficial nature of the contamination. Nevertheless, roots of plants growing in lead-contaminated soils may absorb lead even when present in relatively insoluble forms. A limited translocation from roots to aerial organs may also occur. The vegetables showed no symptoms of intoxication or reduction in yield. Slightly elevated opaque screens or hedges of pine and fir trees could markedly reduce the dispersion of exhaust gases. Dairy cattle were feed hay harvested along a highway. A high proportion of lead ingested with the fodder was limited. However, large quantities of lead accumulated in bones, kidneys, and liver. Although ingestion of 1300 mg lead for 36 days produced no particular symptoms of intoxication in the animals, blood, urine, and milk contained excessive quantities of lead. (Author summary modified)

16239 APTIC NO. 33985

Chadwick, R. C. and A. C. Chamberlain

FIELD LOSS OF RADIONUCLIDES FROM GRASS. *Atmos. Environ., vol. 4:51-56, 1970. 8 refs.*

Solutions of strontium(85), chromium(51), and lead(210) were sprayed onto grassland to measure the initial retention by the herbage and subsequent rate of field loss by weathering (precipitation and winds). The activity initially retained by the herbage was an average 40% of that applied in the spray. The subsequent field loss, corrected for radioactive decay, determined retention half lives of Sr(85) as chloride of about 19 days in the summer and 49 days in the winter. The rate of loss of Gr(51), as chromate, did not greatly differ from that of Sr(85); similar results were determined in the single experiment with tagged particles, but the rate of field loss of Pb(210) was somewhat less. (Author abstract modified)

16240 APTIC NO. 34179

Crocker, William

A DELICATE METHOD OF DETECTING ILLUMINATING GAS IN A GREENHOUSE. *Florist s Exch. Hort. Trade World, vol. 70:15, 54, March 30, 1929.*

Illuminating gas occasionally, or perhaps frequently, causes injury to plants in commercial greenhouses. No greenhouse system should ever have any gas pined into it and if such pipes exist they should be removed. The common source of injury is from corroded or leaky gas pipes. These injuries almost always occur in the late Fall and Winter when there is a frozen crust on the ground and the ventilators of the greenhouses are kept closed. Tests are described which use tomato plants as an indicator of the carbon monoxide present in illuminating gas. Precautions are cited.

16241 APTIC NO. 33324

Darley, E. F.

THE ROLE OF PHOTOCHEMICAL AIR POLLUTION ON VEGETATION. *Council of Europe, Committee of Experts on Air Pollution, Air Pollution Proc. First European Cong. Influence Air Pollution Plants Animals, Wageningen, Netherlands, 1968, p. 137-142. 9 refs. (April 22-27.)*

Photochemical air pollution, a relatively new phenomenon first described near Los Angeles, is now also present in other parts of the world. It results from reactions in the atmosphere between nitrogen oxides and certain hydrocarbons, principally the unsaturated or olefinic hydrocarbons. Automobiles are the principle source of these compounds. The phytotoxic products of these photochemical reactions are peroxyacetyl nitrates, ozone, and nitrogen dioxide. Injury symptoms caused by PAN and ozone are characteristic and different. Plant injury by PAN is confined to the lower leaf surface and appears as silvering, bronzing, or metallic sheen. Some of the best indicators of PAN damage are leafy vegetables and petunias. The characteristic injury symptom of ozone is a stippling, mottling, or chlorosis confined to the upper leaf surface. Concentrations of PAN and ozone below those producing visible symptoms may cause a reduction in plant growth. Nitrogen dioxide does not cause symptoms at ambient concentrations, but may result in growth reductions. Losses from photochemical air pollution are a significant factor in agricultural production. In California the annual direct economic loss may be $10 to $12 million; the indirect loss due to growth retardation, delayed maturity, reduced yields, and impaired quality may be ten times this. (Author abstract modified)

16242 APTIC NO. 33318

Edwards, R. S.

THE EFFECTS OF AIR-BORNE SODIUM CHLORIDE AND OTHER SALTS OF MARINE ORIGIN ON PLANTS IN WALES. *Council of Europe, Committee of Experts on Air Pollution. Air Pollution Proc. First European Congr. Influence Air Pollution Plants Animals, Wageningen, Netherlands, 1968, p. 99-103. 10 refs. (April 22-27.)*

Wales, situated close to the Atlantic Ocean, is strongly exposed to wind-borne salt. The extent of this pollution, and its effect on plants and animals, have not as yet been extensively studied. Cheap, home-made instruments, protected against rain, have been devised to sample the airstream. They enable a survey of salt contamination over large areas. In Pinus nigra highly significant correlations between the instrument reading and samples from naturally contaminated tree branches and degree of damage have been noted. The sodium content of grasses growing in uncontaminated environments have been examined. Experiments are in progress with various strains of Lolium perenne showing by nature widely different Na contents. They are treated with salt, applied as a spray on leaves or to soil. (Author abstract)

16243 APTIC NO. 33331

Guenther, Hans

FEEDING EXPERIMENTS IN HORSES AND A SHEEP WITH FUME DEPOSITS FROM A LEAD WORKS IN GERMANY. *(Fuetterungsversuche mit Flugstaub einer Metallhuette an Pferden und einem Schaf). Text in German. Tieraerztliche Hochschule, Hannover (Germany), Thesis (D Vet. Med.), 47p., 1954. 38 refs.*

The symptoms of three colts (swollen joints, weight loss, lead content in the liver of 0.2 mg) who grazed in the vicinity of a lead smelter led to feeding experiments on a colt and one sheep. Straw obtained 1100 m from the lead smelter and fly ash with 44.79% lead, 8.20% sulfur, 0.22% arsenic, 5.21% zinc and 5.60% chlorine was fed to the animals. The colt received 15 to 20 g fly ash per day, the sheep 2 to 24 g. The experiments lasted for 3 months with the colt and for more than one month with the sheep. Toward the end of the experimental period, the colt suffered heavy paralysis which caused swallowing difficulties and, as a consequence, pneumonia. The lead content in the liver was significantly increased while that of the sheep remained the same. The joints of the colt were also damaged. In similar feeding experiments with fly ash from another plant, the clinical symptoms of lead poisoning wer absent and only the bones of the joints were damaged. This difference occurred because fly ash from the lead smelter contained almost three times as much lead as that from the other plant.

16244 APTIC NO. 34124

Hallaway, Mary and Daphne J. Osborne

ETHYLENE: A FACTOR IN DEFOLIATION INDUCED BY AUXINS. *Science, vol. 163:1067-1068, March 7, 1969. 10 refs.*

Defoliation of tropical trees after exposure to esters of synthetic resins was investigated. Treatment of Euonymus japonica leaves with the n-butyl ester of 2,4-dichlorophenoxyacetic acid caused premature senescence and leaf fall and stimulated ethylene production. Exposure to ethylene alone accelerated senescence and leaf fall. The results determined that the defoliant action of auxin was mediated through the enhanced amounts of ethylene in the blades. Due to the diffusion of ethylene, premature senescence was induced in the untreated parts of the blade, leading directly to the initiation of abscission. (Author abstract modified)

16245 APTIC NO. 33534

Johnson, P. L. and J. J. Kelley, Jr.

DYNAMICS OF CARBON DIOXIDE AND PRODUCTIVITY IN AN ARCTIC BIOSPHERE. *Ecology, 51(1):73-80, Winter 1970. 25 refs. 0NTIS; DDC: AD 715519*

Concentrations of atmospheric carbon dioxide were measured continuously throughout the 1966 thaw season at two stations in the Arctic coastal plain of Alaska. A seasonal decrease in CO2 of 15 ppm was demonstrated, as well as changes in concentration associated with storm frequencies, winds, sea breezes, and diurnal gradients. Correlation between rate of plant growth and declining CO2 concentration in the atmosphere was high. Tundra growth was initiated by mid-June and was 90% completed in mid-July. Standing crop above ground and below ground was estimated to be 82 and 100 g/sq m, respectively. A 23% turnover of 273 g/sq m of litter was confirmed. Gross primary production was estimated at 344 g/sq m. An annual budget for CO2 in an Arctic biosphere is postulated and efficiencies for both energy and carbon storage are calculated. Based on seasonal net radiation, a photosynthetic efficiency of 0.7% was determined, whereas atmospheric CO2 was apparently used at the rate of nearly 12%. Estimates of CO2 turnover due to biological activity are similar to the 10-year residence time of a molecule before adsorption in the sea.

16246 APTIC NO. 33538

Kirste, Hanns

EFFECTS OF AIR POLLUTION ON AGRICULTURE. *(Die Auswirkungen von Luftverunreinigungen auf den Landbau). Text in German. Landwirt. Forsch. Sonderh., vol. 17:1-12, 1963. 28 refs.*

The land in the industrial zone of West Germany known as the Ruhr is 57.4% tillable, which is only slightly below the national average for West Germany. Although in itself suitable for agriculture, it is surrounded by certain influences, notably pollution of the atmosphere close to the soil, which render agriculture a difficult task. About 85% of the power supply of West Germany is derived from raw materials whose combustion creates air pollution problems. Some industrial complexes give off gases and vapors whose combined weight is 10 times that of the dust and fly ash emitted. The term emission, used in a number of European countries, can be defined as the occurrence of solid, liquid, and gaseous air-polluting substances whose effects are principally felt near the ground. The detrimental effects of dust on the marketability of cash crops and the value of crops raised for livestock feed has long been recognized. Only more recently has the relationship between pollution and susceptibility to plant diseases been recognized. In assessing the effect of polluting gases on plants and trees, the determination of physiologically important substances, such a pheophytin, carotin, and the amino acids is just as important as detailed studies with the microscope. In diagnosing the causes of pollution-induced plant diseases, an older technique, that of Sorauer, has been resurrected. A practical illustration is given of the application of this method.

16247 APTIC NO. 33823

Lighthart, Bruce, Victor E. Hiatt, and August T. Rossano, Jr.

THE SURVIVAL OF AIRBORNE SERRATIA MARCESCENS IN URBAN CONCENTRATIONS OF SULFUR DIOXIDE. *J. Air Pollution Control Assoc., 21(10):639-642, Oct. 1971. 23 refs.*

Aerosols of Serratia marcescens ATCC 274 were suspended in a 709L rotating drum at 20 plus or minus one C and high to mid-range relative humidities. At specified times after bacterial aerosolization, sulfur dioxide was added to concentrations of 2.5 or 5.0 mg/cu m. Viable cell decay rates constants, in control aerosols without added SO2, increased rapidly from near 100% to 60% relative humidity in the first hour of suspension, and from a minimum rate constant at 80% in the succeeding four hours. Upon addition of SO2 to a cloud of S. marcescens, generally, viable cell decay rate constants increased further. One exception was at 80% relative humidity where maximum resistance to SO2 accelerated death was observed for old aerosols. Cells in young aerosols were particularly sensitive to SO2 addition at mid-range humidities, while in older aerosols the cells were insensitive to up to five mg SO2/cu m introduced at high relative humidity; but were up to 10 times more sensitive than cells in young aerosols to a given increase in SO2 concentration at mid-range humidities. (Author abstract)

16248 APTIC NO. 33670

Matsuoka, Yoshihiro

POLLUTED AIR DIFFUSION BY ANALOGY WITH ELEMENT CONCENTRATION IN PLANTS (Shokubutsutai seibun kara mita taiki osen shitsu kakusan ni tsuite). *Text in Japanese. Kogai to Taisaku (J. Pollution Control), 7(10):21-35, 1971.*

Pollution conditions of the Ichihara area in the Chiba prefecture were examined, using chemical analysis of plant body elements as indices. Sulfur absorbed from the soil into the plant was carefully examined before determining damage from air pollution. Sulfur content in summer corn in polluted areas showed little difference, except for one location, from that of the controlled area. But sulfur content in wheat measured during winter showed more than 50% higher figures at all locations of the polluted area compared to figures in the controlled area. Figures obtained at two locations were two and three times over that of the average of the controlled area. From an analysis of the sulfur content pattern, emission sources could be determined. The relationship of winter weather and pollution was studied by a wind tunnel experiment and it was confirmed that the Ichihara area was polluted most heavily when a strong north wind was caused by a high pressure in the north. Pollution was limited to the season when the wind direction was from the sea toward the land. Areas up to four km in the lee from the emission source were heavily polluted, but up to eight or nine km, they were also polluted though less heavily. The stack heights of the main smoke sources are less than 100 m, and the highest sulfur dioxide concentration was 0.13%. Sulfur content in the leaves of pear trees in the polluted area was mostly from 0.230 to 0.406% compared to the average of 0.127% in the pear leaves of the control area.

16249 APTIC NO. 33716

Matsushima, Jiro

AIR POLLUTION EFFECT TO THE AGRICULTURE AND FORESTRY. *(Norin sakumotsu ni oyobosu taiki osen no eikyo). Text in Japanese. Ryusan (J. Sulphuric Acid Assoc., Japan), 24(6):22-36, June 1971. 34 refs.*

Influences of sulfur dioxide, agricultural chemicals, nitrogen oxides, and hydrogen fluoride on plants and agricultural produce are discussed. A common damage of SO2 is chlorosis and withering of red pines. The mechanism of damage has not been explained satisfactorily, but it is clearly caused by SO2 oxidation reduction. A plant in its budding stage has a large respiratory capacity and a small photosynthesis ability; as leaves grow, the latter increases and the former decreases, thereby increasing production and accumulation of carbohydrate. The quantity of SO2 absorption increases with the increase in the surface area of leaves, yet a plant s SO2 absorption capacity has little to do with its respiratory capacity; it is more influenced by the tree its respiratory capacity; it is more influenced by the tree s photosynthetic capacity. This is supported by the fact that an orange tree shows the same amount of resistance when exposed to 30 C and 95% humidity in middle March and forced to bud, as it does during winter. Respiration of a tree in winter will increase in high temperature and humidity, but metabolism does not increase. When metabolism is small, the influence of SO2 is small. Spraying trees with glutathione is effective against oxidant damage but it enchances the SO2 damage. The reason might be that glutathione increases photosynthesis or impairs SO2 s reduction of photosynthesis, thus causing the tree to absorb more gas.

16250 APTIC NO. 33337

Ordin, Lawrence, Michael A. Hall, and Juanita I. Kindinger

OXIDANT-INDUCED INHIBITION OF ENZYMES INVOLVED IN CELL WALL POLYSACCHARIDE SYNTHESIS. *Arch. Environ. Health, vol. 18:623-626, April 1969. 12 refs. (Presented at the American Medical Association, Air Pollution Medical Research Conference, Denver, Colo., July 24, 1968.)*

Levels of peroxyacetyl nitrate or ozone which inhibit oat coleoptile section growth reversibly, inhibited formation of cellulose and of cell wall noncellulosic polysaccharides. After treatment of intact cells with PAN, phosphoglucomutase associated with subcellular particles was more severely inactivated than was soluble enzyme. A particulate cellulose synthetase from coleoptiles was inactivated by either ozone or PAN treatment of oat coleoptiles. The results indicate that oxidant induced inhibition of one or more of these enzymes accounts for reduced polysaccharide synthesis. (Author summary modified)

16251 APTIC NO. 33906

Paluch, Jan and Irina Schalenkowa

AIR POLLUTION BY FLUORINE IN POLAND AND ITS TOXIC EFFECT ON HUMANS, ANIMALS AND PLANTS. *(Die Luftverunreinigung durch Fluor in Polen und ihre toxische Wirkung auf Menschen, Tiere und Pflanzen). Text in German. Wiss. Z. Humboldt Univ. Berlin Math. Naturw. Reihe, 19(5):489-492, 1970.*

The major sources of the emission of fluorine compounds to the atmosphere are aluminum phosphorus fertilizer manufacturing plants. In Poland, the superphosphate industry alone produces a fluorine emission of some 4000 to 5000 tons annually, the aluminum industry some 2000 tons. Fluorine has a toxic effect on plants and animals, generally in an area within a radius of 1.5 to 3 km. External symptoms on plants are necrosis of leaf borders which can lead to destruction of their metabolic system and eventual plant death. Some plants, like cabbage, are more resistant than others in this respect. Peach leaves, for instance, are extremely sensitive to fluorine concentrations. The plants in general absorb the fluorine through their leaves and store it; such afflicted plants represent a danger to animals and human beings if taken in as food. The biological and clinical symptoms of fluorosis are due to changes in the calcium and iodine balance in the human or animal organism. Typical externally noticeable symptoms in animals are deformations of long bones, ribs, and joints, followed by lameness. Young animals show disturbances in growth and changes on their teeth. In humans, the most well-known effects are those brought about by fluorine in drinking water. Acute fluorine poisoning can be caused by intake of food which has been contaminated by fluorine compounds. These occur in some insecticides and in some plant sprays.

16252 APTIC NO. 33606

Quinche, J. P., R. Zuber, and E. Bovay

A METHOD FOR THE DETECTION OF FLUOBORATE IN FERTILIZERS. *(Un procede de detection du fluoborate dans les engrais). Text in French. Revue Suisse de Viticulture et Arboriculture (Lausanne), 3(3):71-74, May-June 1971. 6 refs.*

The presence of fluoborate in commercial fertilizer can be detected by growing young Coleus plants in a hydroponic solution to which a small amount of the fertilizer has been added. The plants are grown for two weeks in a glasshouse or in a climatic chamber, then the leaves are plucked and dried, and fluorine and boron are determined. An abnormal and simultaneous increase of both fluorine and boron levels compared to the respective levels in control plants grown under identical conditions, but without the addition of the fertilizer, is proof of the presence of KBF4 in the fertilizer. The method is sensitive down to a fertilizer concentration of 0.1% KBF4.

16253 APTIC NO. 33330

Scheel-Thomsen, A.

ANIMALS AFFLICTED WITH LEAD POISONING FROM MOTOR EXHAUST. *(Dyr blyforgiftede af udblaesning fra motorkoretojer). Text in Danish. Medlemsbl. Dan. Dyrlaegeforen. (Copenhagen), 39:596-598, 1956.*

Three cases of dogs treated for ulcerous conditions of the oral cavity and a trembling of the limbs, which were eventually discovered to be lead poisoning derived from constant exposure to gasoline and automotive exhaust, are reported. The first case typical of all three, was first treated in April 1951. The lesions healed after a stay in the hospital but recurred after he returned home. The dog was also asymptomatic when at the owner s summer home for any length of time. It was discovered that at his winter home the dog spent much of his time around a large automobile garage. After treatment with Antoxol (dimercaprol) and benzyl benzoate, he recovered and had no more symptoms of lead poisoning until his death from cancer several years later. Each of the three involved in animal whose daily activities exposed him to the continual presence of gasolines and exhaust fumes containing tetraethyl lead.

16254 APTIC NO. 33327

Taniyama, Tetsuro and Hiroki Arikado

STUDIES OF THE MECHANISM OF TOXIC GAS INJURY TO CROP PLANTS. IV. THE EFFECTS OF SULFUR DIOXIDE ON THE RESPIRATION OF RICE PLANTS. *(Sakumotsu no gasu shogai ni kansuru kenkyu. IV. Suito no kokyusayo ni oyobosu aryusan gasu no eikyo). Nippon Sakumotsu Gakkai Kiji (Proc. Crop Sci. Soc. Japan), 38(4):593-597, 1969. 2 refs. Translated from Japanese, 14p.*

Experiments were conducted to determine the effect of constant exposure to sulfur dioxide on respiration of rice plants, respiration being a major factor in their dry matter production. Rice seedlings were also studied for their ability to regain respiration by first subjecting them to gas treatment for one hour and then removing the gas from the air flow. Sulfur dioxide severely affected the respiration of rice seedlings, causing a linear drop in respiration with increases in gas concentration. A concentration of 60 ppm inhibited respiration after one hour even before gas removal, with no subsequent recovery of respiration. At one ppm, the respiration rate without exposure remained almost normal but declined after gas removal, without regaining the normal level after three hours. In experiments on rice plants at the highest tillering state, gas concentrations of one, five, 10, and 15 ppm accelerated respiration, while 40 and 60 ppm inhibited the respiration rate. The longer the treatment, the narrower the range of gas concentrations inducing respiration acceleration. When the respiration rate of plants at the highest tillering state was computed cumulatively for a four hour test period, it increased linearly with concentration level to a maximum at five ppm. The curve dropped after the maximum to the normal rate level at 29 ppm. Thus, concentrations above 28 ppm produce adverse effects. (Author summary modified)

16255 APTIC NO. 33364

Ter Haar, Gary L.

THE EFFECT OF LEAD ANTIKNOCKS ON THE LEAD CONTENT OF CROPS. *J. Wash. Acad. Sci., 61(2):114-120, 1971. 25 refs.*

The contribution of lead naturally in the soil, lead in the air, and lead content of the soil from lead deposited from the atmosphere or added artificially to the lead content of plants is examined. Plants grown in a filtered atmosphere were compared with those of a natural atmosphere. Most of the edible portions of the plant showed no effect from the increasing lead content in the air. Crops grown along a busy highway were analyzed. Edible portions of most compact crops, except soybeans and snap beans, showed no correlation between lead concentration and distance from road. The inedible parts contained two to three times higher lead concentrations when grown near the road. The leafy portions of plants near busy highways contained higher concentrations of lead. An increase of lead content in the soil did not change the concentration in the plant. Rain was not a significant source of lead. Seasonal variations and stresses on the plant were studied for correlation.

16256 APTIC NO. 33468

Thompson, C. R., O. C. Taylor, and B. L. Richards

EFFECTS OF AIR POLLUTANTS ON L. A. BASIN CITRUS. *Citrograph, 55(5):165-166, 190-192, March 1970. 5 refs.*

Commercially producing lemon and orange trees were enclosed in plastic-covered greenhouses to which filtered or ambient air was introduced. Various air treatments were applied to test for the effects of total pollutants in ambient air fluoride, ozone, peroxyacyl nitrates, and nitrogen oxides). The photochemical smog complex reduced the rate of water use, apparent photosynthesis, and yield of fruit in trees receiving ambient air. Fluoride levels in the atmosphere were too low to cause detectable effects. Leaf drop was significantly less in lemons receiving carbon-filtered air than in those receiving ambient air. A similar trend occurred in navel oranges. Fruit drop in navel oranges was also significantly less in carbon-filtered air. Yield of mature fruit is reduced in some cases by as much as 50%. (Author summary modified)

16257 APTIC NO. 33811

Ting, Irwin P. and S. K. Mukerji

LEAF ONTOMGENY AS A FACTOR IN SUSCEPTIBILITY TO OZONE: AMINO ACID AND CARBOHYDRATE CHANGES DURING EXPANSION. *Am. J. Botany, 58(6):497-504, July 1971. 20 refs.*

During development (expansion), the cotton leaf passes through a stage in which it is highly susceptible to ozone. This period of susceptibility occurs after the maximum expansion rate but before complete expansion occurs. The period of maximum susceptibility corresponds to a minimum concentration of soluble sugars and free pool amino acids. Specific amino acids such as asparatate, serine, threonine, glutamate, asparagine, alanine, glycine, valine, isoleucine, leucine, histidine, and tryptophan tended to reach a minimum concentration at about the same time leaves were susceptible to ozone. Ozone exposure during the susceptible period is manifested by visible leaf flecking of the upper surface and a dramatic (up to two-fold) increase in total free pool amino acids. Most individual amino acids tended to increase except for phenylalanine, alanine, phosphoserine, phosphoethanolamine, and ethanolamine. Soluble protein is decreased but not to the same extent that the free pool amino acids increase. Because there is ample evidence that ozone enters the leaf during nonsusceptible periods as well as susceptible periods, it is postulated that ozone damage results because of the depletion of soluble reserves (carbohydrates and amino acids). Perhaps repair of damage cannot occur. (Author abstract)

EFFECTS-MATERIALS

16258 APTIC NO. 33592

PANEL DISCUSSION–PROBLEMS IN MAINTENANCE OF FUEL OIL DESULFURIZATION. *(Juyu datsuryu sochi no fushoku to hozenjo no mondaiten -- Paneru toron). Text in Japanese. Sekiyu Gakkai-shi (J. Japan Petroleum Inst., Tokyo), 14(9):696-716, Sept. 1971.*

The corrosion and subsequent thinning of welded parts have been found to cause leakage in effluent reactor air coolers. Materials deterioration was caused by the exposure of the air cooler to hydrogen sulfide, ammonia, and condensed water. The corrosion of heavy oil desulfurization apparatus has also been reported. This has included the cracking of steam stripper tower piping, damage to emergency pressure regulators, and corrosion to the hydrogen sulfide stripper tower condenser piping. Chloride corrosion has also occurred to various desulfurization equipment. Countermeasures are indicated.

16259 APTIC NO. 33709

ALUMINUM TRUSSES FOR EXTERIOR PIPE AT NOVA SCOTIA PULP RESIST SEA AIR AND SO2. *Pulp Paper Mag. Can. (Quebec), 72(10):40, 42, Oct. 1971.*

Pipe trusses for a mill of a Nova Scotia pulp company were subject not only to sulfur dioxide mill gases but also to salt air causing corrosion. Aluminum was, therefore, used in place of the more readily corroded galvanized steel. The aluminum alloys used design considerations are examined. At connections between trusses and towers, phenolic laminate pads were used under bearing plates to allow the truss to move freely, compensating for thermal effects.

16260 APTIC NO. 34138

Cavender, James H.

DISCUSSION OF PROJECT DATA. *In: Interstate Surveillance Project: Measurement of Air Pollution Using Static Monitors. Air Pollution Control Office, Research Triangle Park, N. C., Interstate Surveillance Project, APCO Pub-APTD-0666, p. 17-31, May 1971.*

NTIS: PB 200519

Project data for the Interstate Surveillance Project are reviewed for frequency distribution of measurements. Results for 1967 and 1968 were not significantly different. Levels at the background stations were significantly lower for components other than those related to an oxidant or ozone effect. Seasonal effects were noted for rubber panels, dyed fabrics, the sulfation candle and plate, dustfall buckets, and adhesive paper. (Author summary modified)

16261 APTIC NO. 33613

Fujisaki, Mamoru, Katsumi Takayama, and Tomoyoshi Nishino

CORROSION AND DAMAGE OF MATERIAL OF DESULFURIZING APPARATUS. *(Datsuryu-sochi ni okeru zairyo no fushoku to sonsho). Text in Japanese. Preprint, Japan Petroleum Inst., Tokyo, p. 35-42, 1971. (Presented at the Seminar on Heavy Oil Desulfurization Apparatus, Tokyo, Japan, March 22-23, 1971, Paper 6.)*

Corrosion and damages to materials of various hydrodesulfurization systems are examined with respect to investigations of damage cases, application of steel, treatments and controls for corrosion, correlation with time in a sulfuric environment, effects of chrome content in the steel on the corrosion ratio, and the influence of hydrogen sulfide on carbon steel. Damaged materials and their causes included sulfuric stress corrosion cracks; high welding residue stress and external vibration stress for austenite stainless and carbon steels; valve seat and disk cracks in ferrite stainless steel. The heat treatment process is examined. Cracking was prevented by heating chromium-nickel (18:8) steel at 550 C or more and chromium-nickel-titanium) (18:8) steel at 450 C or more. High temperature dry sulfuric environment corrosion rate was determined with relation to time and depth of corrosion. Steel treated with aluminum dispersion transmission was resistant to high temperature oxidation, sulfuric corrosion, wearing, and peeling and was easily welded. The material tested was efficient at temperatures ranging from 50 to 460 C and under 30-170 kg/sq cm pressure.

16262 APTIC NO. 34275

Horgan, A. M. and D. A. King

KINETICS OF ADSORPTION, REPLACEMENT AND CATALYSIS IN THE INTERACTION OF 02 AND CO WITH CLEAN NICKEL SURFACES. *Trans. Faraday Soc., 67(583):2145-2157, July 1971. 21 refs.*

The kinetics of the interaction of oxygen with carbon monoxide on nickel films under ultra-high vacuum conditions were investigated with an apparatus designed for sticking probability profile measurement. Absolute rates of adsorption, replacement, and catalysis, and surface coverages in the reacting species were simultaneously measured. The results reveal marked differences in the chemical reactivity of the different binding states in the adlayer. The catalytic reaction of preadsorbed 02 with gaseous CO to form CO2 proceeded only when the coverage Theta in the preadsorbed 02 layer was less than one-fourth monolayer. The catalytically active species Beta prime-02 less than one-fourth monolayer. The catalytically active species Beta prime-02 was converted to a more tightly bound, inert species Beta-02 at Theta 02 less than one fourth monolayer. This transformation had a marked effect on the stocking probability profile for 02 on Ni. Reaction kinetics indicate that the Beta prime-02 state is nondissociatively adsorbed. When gaseous 02 is introduced to Ni films with preadsorbed CO, the latter is efficiently and quantitatively displaced from the surface as CO and CO2. The strongly bound Beta-CO state yields CO2 and a more weakly bound alpha-CO state yields CO. Both processes are preceded by a short induction period. Reaction mechanisms are proposed which are supported by infrared data obtained from supported nickel-on-silica samples. The continuous catalytic reaction of CO with 02 to form CO2 over 02-presaturated Ni films was also examined, and a possible reaction mechanism is discussed. (Author abstract modified)

16263 APTIC NO. 33611

Iida, Wataru

PROBLEMS IN REACTION TOWER EFFLUENT AIR COOLER. *(Hannoto efurento kuki reikyakuki no mondaiten). Text in Japanese. Preprint, Japan Petroleum Inst., Tokyo, p. 55-57, 1971. (Presented at the Seminar on Heavy Oil Desulfurization Apparatus, Tokyo, Japan, March 22-23, 1971, Paper 9a.)*

Corrosion of heavy oil desulfurization apparatus in an oil refinery was investigated. Leakage on the pipe system of the reactor condenser, corrosion at the welded sections of tubes, and the principles of the flow process are examined. Corrosion, localized inside the elbow, occurred without scale forming. The constant exposure to highly concentrated hydrogen sulfide and ammonia solution was determined as the cause. The damages due to corrosion were treated by slowing down the flow rate, using corrosion-resistant ferrules, applying anti-corrosion resin lining, and covering vulnerable materials with stainless steel.

16264 APTIC NO. 33643

Iida, Wataru

SPLIT IN REACTOR ENTRANCE ELBOW FOREIGN MATERIAL WELDING. *(Hannoto iriguchi erubo izai yosetsubu no ware). Text in Japanese. Preprint, Japan Petroleum Inst., Tokyo, p. 103-105, 1971. (Presented at the Seminar on Heavy Oil Desulfurization Apparatus, Tokyo Japan, March 22-23, 1971, Paper 12b.)*

Cracks discovered on the reactor entrance elbow after eight months operation of desulfurization equipment were investigated. The thickness and construction were examined for differences between the welded part and the reactor material. Corrosion due to hydrogen sulfide solution and stress caused locally by the elbow shape and welding residue were determined. Heat-resistant coating was applied as temporary treatment. The entire elbow was later reconstructed of chromium-molybdenum (2 1/4-1) and welded with the same material.

16265 APTIC NO. 33602

Ikkai, Shunkei, Yasuo Ishimaru, and Kenichi Takanashi

HEATING-TIME RELATIONSHIP IN PADDING AND WELDING PART TRANSFORMATION. *(Nikumori yosetsubu no aknetsu jiko henka). Text in Japanese. Preprint, Japan Petroleum Inst., Tokyo, p. 43-46, 1971. (Presented at the Seminar on Heavy Oil Desulfurization Apparatus, Tokyo, Japan, March 22-23, 1971, Paper 7.)*

The influence of time and temperature on the decarburized layer of foreign material in a desulfurization plant reactor was examined. In order to eliminate stress, decarburization and cementation occur in the padded welding section after the heat treatment. The welded part further deteriorates under the influence of extended heating and in the environment of sulfuric material ultimately developing cracks. Decarburization and cementation decreased in proportion to the amount of chromium in the molybdenum steel. Stretch, shock, and bend were tested. Stress concentration was 1.6. The reduction of absorbent energy with the increase of heat treatment was extreme. Stretch in relation to heating time was determined. The bending test determined micro-cracks in the side-bend for heat treatments of 650 C for more than 10 hours.

16266 APTIC NO. 33598

Irie, Masao

EROSION OF HIGH PRESSURE SEPARATOR EMERGENCY PRESSURE CONTROL VALVE. *(Koatsu separeeta kinkyuyo atsuryoku kontororu barubu no fushoku). Text in Japanese. Preprint, Japan Petroleum Institute, Tokyo, p. 79, 1971. (Presented at the Seminar on Heavy Oil Desulfurization Apparatus, Tokyo, Japan, March 22,23, 1971, Paper 10c.)*

Corrosion in a high pressure separator of an oil refinery was investigated. An emergency pressure control valve damaged three month after start of operations. Localized damage 0.2 mm deep was determined on the plug, the curved line under the seat, and the seat ring. The entrance and exit pressures wore 91 and 0 kg/sq cm, and the temperature was 60 C. Severe and drastic damage was caused by the slight leakage of corrosive gas between the plug and the seat ring, intensified by the angular shape of the valve, and due to its usually closed state. Severe corrosion due to sulfur dioxide was determined in the reducer around the pressure control valve in the low-pressure seperator. Corrosion treatment included careful selection of material and anti-corrosion treatments when designing the apparatus.

16267 APTIC NO. 33651

Irie, Masao

CORROSION AND TREATMENT OF DECOMPRESSION LIGHT OIL DESULFURIZING SYSTEM. *(Genatsu keiyu datsuryu sochi no fushoku to taisaku). Text in Japanese. Preprint, Japan Petroleum Inst., Tokyo, p. 59-60, 1971. (Presented at the Seminar on Heavy Oil Desulfurization Apparatus, Tokyo, Japan, March 22-23, 1971, Paper 9b.)*

Corrosion of tubes and pipes in the apparatus of an oil refinery was investigated. The conditions under which hydrogen sulfide corrosion occurred are examined with respect to desulfurized solution, temperature, pressure, and hydrogen and hydrogen sulfide content.

16268 APTIC NO. 33674

Iwanaga, Tatsuo, Kazuhiko Mizuno, and Hiroji Takeuchi

PROBLEMS OF CORROSION IN HYDROGEN MANUFACTURING SYSTEM. *(Suiso seizo sochi no fushoku ni yoru mondaiten). Text in Japanese. Preprint, Japan Petroleum Inst., Tokyo, p. 115-119, 1971. (Presented at the Seminar on Heavy Oil Desulfurization Apparatus, Tokyo, Japan, March 22-23, 1971, Paper 13b.)*

Corrosion in the hydrogen manufacturing system of an oil refinery was investigated. Pressure differences on valves were determined as the cause of leakage. The difference of pressures at the globe valve was 20 kg/sq cm. An additional valve was added and the pressure was distributed. The size and type of a control valve was changed. Anti-corrosive additive used in the system was effective where the corrosion rate was less than 0.2 mm/year. The corrosion resistant coating could not form where flush occurred due to pressure change. Corrosion of parts of the pipe system and on a stainless steel heat exchanger was due to carbon dioxide.

16269 APTIC NO. 33802

Kautz, K.

CAUSES FOR CORROSIONS IN INCINERATORS FOR DOMESTIC REFUSE. *(Korrosionsurasachen in Hausmuellverbrennungsanlagen). Text in German. Mitt. der Grosskesselbetr., 51(5):396-402, Oct. 1971. 18 refs.*

Incinerators for domestic refuse suffer from corrosion due to chlorine compounds. Hydrogen chloride reacts with components of the coating of the pipes, the steel, and the steel s oxide layer. The flue gas contains chlorides, oxygen, sulfates, carbon dioxide, and sulfur dioxide. Silicon compounds, oxides (including aluminum and iron oxides), calcium sulfate, and alkaline metal sulfates are also emitted. Lead can occur as lead sulfate or lead chloride. Hydrogen chloride is produced by the burning of polyvinyl chloride.

16270 APTIC NO. 33838

Long, Sue Hamburger and Dorothy Saville

EXPOSURE OF FABRICS TO A POLLUTED ATMOSPHERE: APPARATUS TO PRODUCE HIGH HUMIDITY. *Am. Dyestuff Reptr., 60(10):48, 50, 53, Oct. 1971. 5 refs.*

An apparatus was devised and used successfully to produce a humid atmosphere which was polluted with sulfur dioxide and propelled into a darkened fabric exposure chamber. Fabrics made of acetate, triacetate, cotton, acrylic, modacrylic, nylon, and polyester were exposed to the SO2 atmosphere at two temperature levels to determine the effect of the exposure on filling breaking strength. Breaking strength was determined on half of the specimens following exposure and on the remaining specimens after they had aged 30 days. Acetate, acrylic, nylon, and polyester decreased in strength upon exposre. Nylon was most consistent in reaction at the two temperature levels and age periods. Triacetate and cotton decreased in strength at some conditions, and the modacrylic fabric increased in strength. (Author abstract modified)

16271 APTIC NO. 33612

Mizuno, Kazuhiko, Tatsuo Iwamizu, and Hiroji Takeuchi

PROBLEMS IN WET H2S CLASS MACHINES AND PIPE INSTALLATION. *(Shitsu-H2S kei kiki, haikan no mondaiten). Text in Japanese. Preprint, Japan Petroleum Inst., Tokyo, p. 71-73, 1971. (Presented at the Seminar on Heavy Oil Desulfurization Apparatus, Tokyo, Japan, March 22-23, 1971, Paper 10a.)*

Corrosion of the heat converter, cooler, and separators of the desulfurization apparatus of an oil refinery was investigated. Localized corrosion, as deep as 9.0 m/m, on the valve near the exit nozzle and the shell of the effluent after-cooler was related with a whirlpool of liquid in the vicinity. Corrosion on the surface of the separator overhead condenser tube occurred as a hole caused by metal loss in the direction of the flow. Similar corrosion was determined in the separator. The damages were correlated with the stopping of the liquid flow. The corrosion inhibitor failed to form a coating inside the tubes.

16272 APTIC NO. 33665

Naito, Katsuyuki, Tetsunosuke Hashimoto, and Takehiko Kihara

STRESS CORROSION CRACKING OF MILD STEEL IN THE GAS TREATING PLANT. *(Gasu seisei sochi (datsu tansan) niokeru nanko no oryoku fushoku ware). Text in Japanese. Sekiyu Gakkai-Shi (J. Japan Petroleum Inst., Tokyo), 14(9):672-678, Sept. 1971. 15 refs.*

Stress corrosion cracking of mild steel in gas purification processes used in industries to remove acid gases from gas streams was investigated. Cracks were determined in the regenerator, heat exchanger, and piping, all made of carbon steel, in a carbon dioxide removal process using activated hot potassium carbonate solution. The cracks were transgranular and were easily duplicated on the ring weld specimens installed in the regenerator. In the absorber, the duplicated cracks were relatively small. High tensile strength steel was more sensitive to the cracking than mild steel.

16273 APTIC NO. 33600

Naito, Masayuki, Tetsunosuke Hashimoto, and Tatehiko Kihara

STRESS CORROSION CRACKS OF SOFT STEEL OF GAS REFINING APPARATUS. *(Gasu seisei-soshi (dattansan) ni okeru nanko no oryoku fushoku ware). Text in Japanese. Preprint, Japan Petroleum Inst., Tokyo, p. 47-51, 1971. (Presented at the Seminar on Heavy Oil Desulfurization Apparatus, Tokyo, Japan, March 22-23, 1971, Paper 8.)*

Stress corrosion cracks which developed on soft steel instruments of the decarburization system of gas refining apparatus were investigated. The process consisted of arsenic oxidized material added to the refining solution and heat-activated potassium carbonate. Cracks by transgranular corrosion appeared on the regenerator, solution heat exchanger, and the surrounding pipe system. Tests performed to reconstruct similar cracks caused by residual stress confirmed the corrosion and the effectiveness of stress elimination heat treatments. Pitting seemed to contribute to the appearance of cracks, which were deterred by contact with different metals.

16274 **APTIC NO. 33597**

Naruse, Gen

EROSION SPLIT OF STEAM STRIPPER OH LINE. *(Steam Stripper OH line no fushoku ware ni tsuite). Text in Japanese. Preprint, Japan Petroleum Institute, Tokyo, p. 75-77, 1971. (Presented at the Seminar on Heavy Oil Desulfurization Apparatus, Tokyo, Japan, March 22-23, 1971, Paper 10b.)*

Cracks discovered on the UOP Isomax at an oil refinery one week initial operation were investigated. Three cracks on bead of welded connections and one on an elbow of the stream stripper overhead line were determined. Operating conditions of temperature, pressure, material construction, liquid composition, flow speed, and volume of hydrogen sulfide was examined. The elbow was not heat-treated by the manufacturer. Microscopic sulfur print tests of the cracks revealed sulfur particles. A high concentration of hydrogen sulfide, high residual stress, such as vibration due to an earthquake, and imperfect welding were determined as the causes of the damage. The carbon steel was repaired and since then the corrosion rate has been extremely low (0.35 mm/year).

16275 **APTIC NO. 33599**

Niwa, Kiyoshi

HEAVY OIL DESULFURIZATION PLANT REACTION TOWER EFFLUENT AIR COOLER. *(Juyu datsuryu puranto hannoto efuruento kuki reikyakuki no fushoku to mondaiten). Text in Japanese. Preprint, Japan Petroleum Institute, Tokyo, p. 61-63, 1971. (Presented at the Seminar Heavy Oil Desulfurization Apparatus, Tokyo, Japan, March 22-23, 1971, Paper 9c.)*

Corrosion of carbon steel effluent condenser pipes of reactor in the desulfurization system of an oil refinery was investigated. Maximum corrosion of 0.7-0.9 mm/month was determined on condenser u-bend tubes. Straight pipes showed normal wear, with some localized corrosion as high as 2.8 mm/year. When the u-bends were replaced by T-shape bends, corrosion of 0.5-0.7 mm/month still occurred. Almost all corrosion occurred in the bends of lower tubes (condensed area), but the locations of eroded tubes in relation to the tube bundles were irregular, and the ratio of corroded tubes to the total number of tubes was small. A high speed flow (more than 20 ft/sec) was determined as the cause of corrosion, affected by flow irregularity. Change of flow direction at the bend and solution of welding bead caused localized corrosion. An inhibitor was effective in reducing corrosion to 0-0.2 mm/month. Corrosion treatment and reduction included decreasing flow speed, even flow distribution, pipes made of high corrosion-resistant material ferrite-type steel, and monitoring of chlorine content.

16276 **APTIC NO. 33481**

Orlowski, P.

AIR POLLUTION AS A FACTOR IN CORROSION. *(La pollution atmospherique facteur de corrosion). Text in French. Usine Nouv. Paris, no. 24:147-149, June 12, 1969. 4 refs. (Presented at the Association pour le Developpment des Sciences et des Techniques de l Environment, March 31-April 1, 1969.)*

The work of various authors on the relationship between pollution and the corrosion of materials is reviewed. The main agents of corrosion in polluted air are carbon dioxide, oxides of nitrogen, oxides of sulfur, and material adhering to soot particles. Of these, the action of sulfur dioxide is the most intense. This is illustrated by a number of graphs showing a correlation between air polluted with SO2 (0.01%) and the corrosion of various metals (esp. iron and zinc).

16277 **APTIC NO. 33354**

Rajagopalan, K. S., P. Annamalai, M. Sundaram, C. Rajagopal, and V. Chandrasekaran

ATMOSPHERIC CORROSION OF METALS AT MANDAPAM CAMP, INDIA. *Brit. Corros. J., 6(4):175-183, July 1971. 21 refs.*

Atmospheric corrosion of metals in tropical marine locations was studied at Mandapam Camp to determine the relationship with meteorological factors and atmospheric salinity. Mild steel, pure zinc, copper, brass, aluminum, and stainless steel were exposed to atmospheric influences and examined for corrosion rate (monthly, quaterly, yearly, two yearly), effect of duration of exposure on corrosion, comparison between amount of corrosion on upward and downward facing surfaces, effect of angle of exposure, height comparison between amount of corrosion during night and day, and effect of distance from sea on corrosion and salinity. Relative humidity, rainfall, temperature, wind velocity, and salinity of the atmosphere were monitored. The highest corrosion rates were determined when the salinity and temperature were highest and the average humidity was above 75%. The rate of corrosion increased linearly with time of exposure, and there was more corrosion on the skyward site than on vertical exposure at ground level and on exposure during the night. The corrosion of metals was inversely proprotional to the distance from the sea only during the months of high salinity.

EFFECTS-ECONOMIC

16278 **APTIC NO. 33384**

Kellogg M. W. Co., Piscataway, N. J., Research and Engineering Development

ECONOMIC EVALUATION OF METAL OXIDE PROCESSES FOR SO2 REMOVAL FROM POWER PLANT FLUE GASES. PHASE 3. COST SENSITIVITY STUDY OF MAJOR PROCESS PARAMETERS. (FINAL REPORT). *National Air Pollution Control Administration Contract PH 86-68-86, Rept. APTD-0689, 198p., March 31, 1970.*

NTIS: PB 200882

The effects of major process parameters on plant investment and operating costs were determined for dry, regenerable sulfur dioxide removal processes, e.g., processes treating hot (equal to or greater than 300 F) gases containing low sulfur oxide concentrations. A tabulation of the parameters is included. The variables were evaluated for dispersed phase (adsorption) fluid bed (alkalized alumina) and fixed bed process (alkalized alumina) designs. A copy of the flow sheet, process description, battery limit investment, and operating costs for each design is included. Because a chemically regenerative metal oxide sorbent will require a reducing gas and a Claus plant (or sulfuric acid plant), and since the costs of sulfur based on these two items alone is greater than the expected selling price, all the processes will cost money and increase the cost of power. A sulfur oxides-removal plant sized to treat only one half of power-plant flue gases shows the lowest investment cost of all combinations studied and will add about $2.50/ton to the coal cost. This mode of operation will require the burning of low-sulfur coal in half of the plant during peak power generation when the plant is operating at full capacity. During off-peak power generation, only high sulfur coal will be burned since the flue gas can be treated during these periods. The potential savings dictate a closer look at this concept for any location where a SO2-removal plant is considered.

16279 *APTIC NO. [illegible] 30*

Nordrhein-Westfalen Arbeits- und Sozialminister (West Germany)

IMMISSION AND EMISSION CONTROL. (Ueberwachung der Immissionen und Emissionen). Text in German. In: Reinhaltung der Luft in Nordrhein Westfalen. Essen, West Germany, Brinck and Co. KG, 1969, p. 53-65.

Since 1962, particulate emissions are measured over a total area of 6225 sq km by one measuring station per sq km on 4150 sq km and one measuring station for each 4 sq km on 2075 sq km. Sulfur dioxide emissions are measured on 5026 sq km by one station for each sq km. Particulates are measured (continuously) by the Bergerhoff device, SO2 by the silica gel method. A comparison of monitoring results from 1963 and 1967/8 reveals that in almost all areas both SO2 and particulate emissions were reduced. The areas in which maximal emission limit were exceeded since the measuring program began dropped for particulates from 365 sq km in 1964/65 to 234 in 1967/8 and for SO2 from 248 sq km in 1964/5 to 43 sq km in 1967/8. In 12 cities a continuous SO2 monitoring service is in operation which issues smog alerts. The state emission protection law grants the authorities the right to order emission measurements performed by a polluter at his cost. This right is being applied in cases of newly constructed enterprises and following expansions of established enterprises, mainly for SO2 and particulates but also for other pollutants where the situation demands. Since 1966 emissions from steam and hot water boilers are supervised on a systematic basis, and, where maximal emission levels are exceeded, the polluters are prosecuted. All oil-fired central heating systems are periodically tested by district chimney sweeps by the Bacharach method and fines are levied for violations. Heating plants in all local and state government buildings are being also tested regularly.

16280 APTIC NO. 33747

READY TO MAKE FINANCIAL CONTRIBUTIONS CHEMISTRY AND ENVIRONMENT. *(Zu finanziellen Aufwendungen bereit Chemie und Umwelt). Text in German. Wasser Luft Betrieb, 15(10):368, Oct. 1971.*

The Organization of Chemical Industries declared itself ready to make financial contributions to solve the problem of environmental protection in its annual report. Between 1960 and 1969, more than $.925 billion have been appropriated for measures serving environmental protection. For 1970 to 1974, a similar amount will be spent for this purpose. The industry furthermore declared that it is up to the government to create priorities, since not everything can be done at the same time. Also, the government has to pass sound laws, to take care of urban planning so that industrial centers are kept apart from residential areas and to distribute the costs for anti-pollution measures adequately. It is doubtful whether the attitude that the polluter has to carry the costs for the clean-up alone is a wise one. The industries would be forced to raise the price of their products, since no investments would be feasible without profit. Thus indirectly the costs would be passed on to the public. The chemical industry aims at a total conversion of the raw material into marketable products. It would have the benefit of leaving no waste products (in the form of waste gases). All research work is geared to that final goal.

16281 APTIC NO. 34042

MEETING ENVIRONMENTAL NEEDS...I - INVESTMENT COSTS. *Combustion, 43(4):8-9, Oct. 1971. (Also: Ebasco News, March-April 1971.)*

As estimate of the investment and energy costs for thermal electric plants scheduled for operation in 1976, clearly demonstrates the incremental costs associated with power plant environmental requirements. Investment estimates vary from $135 to $285 for the 800-MW plant and from $125 to $245 for the 1100-MW plant. The energy costs, based on 34 cents per million Btu for all fossil fuels, and ranging from 7.3 to 10.9 mills per kwh for the smaller plant, also increase with the complexity associated with the energy source. They are slightly lower for the 1100-MW plant. Plant designers tend to think primarily of the results of water, air, and noise environmental considerations in plant costs. However, these considerations are involved in only 40% of the plant investment; the remaining 60% is required for delivery of the power to the customer--through transmission and distribution systems. Environment requirements are cited.

16282 APTIC NO. 34107

Chapman, Duane and Robert V. ONeill

ECOLOGY AND RESOURCE ECONOMICS. AN INTEGRATION AND APPLICATION OF THEORY TO ENVIRONMENTAL DILEMMAS. *Oak Ridge National Lab.- National Science Foundation, Environmental Program and Oak Ridge National Lab., Oak Ridge, Ecological Sciences Div. Atomic Energy Commission Contract W-7405-eng-26, ORNL-4641, 36p., Dec. 1970. 14 refs.*

NTIS: ORNL-4641

A functional system provides the needed framework for the effective integration of economics with ecology. The state of a functional system at any point in time can be defined in terms of the current values for a set of variables, e.g., costs and values in the economic system or population numbers in the ecological system. The fractional or dynamic aspects of the system can then be expressed by a set of mathematical functions relating changes in each variable to other variables or external parameters. A number of functional systems forming the subject matter of ecology and resource economics are listed. To illustrate a functional system, power production is described within a matrix of five energy sources, six stages of production and distribution, and interactions with ecosystems and nonmarket costs. These nonmarket costs are the basis for substantial divergence between social and market equilibria. Consequences of the divergence include brownouts, siting controversies, and pollution. The theory of expected utility maximization is used to suggest that expected costs of outcomes exceed the costs of expected outcomes. Functional analysis could define public polices leading market equilibria to more close approximate social equilbria.

16283 APTIC NO. 33889

Kneese, Allen V.

POLLUTION AND THE PROFIT MOTIVE. *Preprint, American Inst. of Industrial Engineers, New York, p. 21-25, 1970. (Presented at the Joint Engineering Management Conference, 18th, The Engineering Manager and the Progress-Profit Dilemma, Chicago, Oct. 29-30, 1970.)*

The general problem of common property resources, production, consumption, residuals, and the functioning of the economy were discussed. The one feature which all the common property resources have in common is that they are subject to congestion. The urgent need to manage congestion of common property resources more effectively and efficiently is being realized. The unwanted by-products of production are congesting the unpriced environmental media so that rapidly rising external costs are being imposed on the population. Since the environmental media are unpriced, the private profit motive does not take account of their value, and they are overused, misused, and degraded. The total weight of residuals discharged to the environment tends to rise with the increases in manufacturing activity and energy conversion unless there are gains in the technical efficiency of converting inputs to useful outputs or the recycling of used goods is increased. Most residuals do not have to be discharged to the environment. In many instances, it is possible to recycle them back into the productive system. The common property problems associated with disposal of residuals take on diverse dimensions. If the enterprise system is to be preserved, the matter of pricing common property resources through the medium of government should have the highest priority.

16284 APTIC NO. 34216

Kohn, Robert E.

ACHIEVING AIR QUALITY GOALS AT MINIMUM COST. *Wash. Univ. Law Quart., Summer 1968:325-360. 31 refs.*

Curves charting the costs of maximum possible reduction in sulfur dioxide emissions were constructed for various sectors of control in St. Louis: sulfuric acid plants, open burning of refuse, industrial coal and oil uses, residential coal uses, and commercial and institutional sources. In each area, marginal costs were determined for different reduction methods, e.g., reducing industrial emissions by burning low-sulfur coal, using natural gas, or cleaning stack gases. From the individual cost curves, a total cost curve was derived that indicates the minimum cost of reducing SO_2 emissions in a three-month period from 94,848 tons to the 35,500 tons recommended by the Public Health Service. According to the curve, the elimination of 59,000 tons of SO_2 can be achieved at costs up to $55.00/ton. Thus, all methods costing less than this would be utilized. Some would be instituted by regulations, such as two percent sulfur-content of fuel. Others could be expected to be voluntarily adopted, such as conversion to natural gas or installation of stack-cleaning devices. The curve does not represent the benefits of SO_2 reduction, but such a curve can help a community achieve a desired air quality goal with the least expenditure of funds.

16285 APTIC NO. 34277

Millecan, Arthur A.

A SURVEY AND ASSESSMENT OF AIR POLLUTION DAMAGE TO CALIFORNIA VEGETATION IN 1970. *California State Dept. of Agriculture, Sacramento, Bureau of Plant Pathology, Environmental Protection Agency Contract CPA 70-91, Rept. APTD-0694, 48p., June 1971. 34 refs.*

NTIS: PB 200873

The California Department of Agriculture in cooperation with county agricultural commissioners made a statewide survey in 1970 to determine areas of occurrence of plant injury due to air pollutants, and to assess the damage to agricultural plant crops. Efforts were concentrated in areas with known histories of air pollution problems. On the basis of observations and evaluations by agricultural specialists; California s 1970 crop losses from air pollution approach $25,690,680. These losses were confined to 15 of the 58 counties in the state. Losses to citrus plantings in the Los Angeles Basin accounted for $19,553,400 of the total monetary losses. Ventura County, with a loss of $10,723,590, experienced the greatest economic crop loss for any one county. Plant injury was observed in 22 counties. The monetary loss figure does not include losses attributed to reduction in crop yield as a result of invisible damage with the exception of citrus and grapes. Monetary losses to native vegetation including forests or to landscape plantings also were not included. Photochemical smog accounted for most of the economic losses. Six pollutants were involved and accounted for the following percentages of plant injury: ozone, 50% peroxyacyl nitrates, 18%; fluorides, 15%; ethylene, 14%; sulfur dioxide, 2%; and particulates, 1%. (Author abstract modified)

16286 APTIC NO. 33501

Tybout, Richard A.

PRIVATE AND SOCIAL COSTING AND PRICING AS DECISION DETERMINANTS. *Purdue Univ., Lafayette, Ind., Water Resources Research Center. Proc. Nat. Resource Systems Models Decision Making Seminar, Lafayette, Ind., 1969, p. 152-161. 3 refs.*

NTIS: PB 19711

The calculations made in cost-benefit analysis and the private profit calculations are of the same form. In the latter, costs external to the enterprise are not included as the market mechanism does not force the enterprise to do this. One objection to the resulting divergence between social and private costing is the attendant inefficiency. In regard to water pollution, two approaches to internalize social costs were advanced. There are legal accountability with interindustry compensation and bribery. The latter is argued to be impractical. By way of example, the case of an enterprise A, damaging a downstream enterprise B, is outlined. A compensation policy is beset with problems too. For example, social accountability presumes a greater knowledge of physical processes than seems practical. The non-appropriability of public goods makes damage evaluation very difficult. Alternatives available to the Government to decrease the discrepancy between private and social costing are enforced waste ownership, effluent taxes, quality standards, and tax credits. Private and social costing lead to rather different decisions in regard to pollution production and abatement. Bringing these calculations in better accord is a complex, physical, economic, and political problem. It can, however, yield substantial efficiency benefits. (Author abstract modified)

16287 APTIC NO. 33642

Utsu, Motoo

PROBLEMS IN SECURITY OF EFFLUENT HEAT EXCHANGER. *(Efuruento netsuko no hozenjo no mondaiten). Text in Japanese. Preprint, Japan Petroleum Inst., Tokyo, p. 107-109, 1971. (Presented at the Seminar on Heavy Oil Desulfurization Apparatus, Tokyo, Japan, March 22-23, 1971, Paper 12c.)*

Over-size refinery apparatus, especially heavy oil desulfurization equipcmnt, is reviewed for cost of maintenance, operation, and protection from corrosion. An overhaul of a heat exchanger can cost as much as $8000. The operation of overhauling consumes many man-hours, due to the bolt sizes. The unit cost of a bolt can reach $560. Since most apparatus is made of austenite steel, it is susceptible to corrosion from polythionic acid. One protection against corrosion may be cleaning with 5% soda ash solution.

STANDARDS AND CRITERIA

16288 APTIC NO. 33348

Japanese Industrial Standards Committee

ANALYSIS OF FUEL GASES BY HEMPEL METHOD. *(Nenryo gasu no Henperu-shiki kaiseki hoho). Text in Japanese. JIS K 2301, 10p., Sept. 1970.*

Regulations are presented which standardize the procedures of composition analysis of ordinary city fuel gas utilizing the Hempel method. The materials subject to standardization are carbon dioxide (CO_2), unsaturated and aromatic hydrocarbons (C_mH_n), oxygen (O_2), carbon monoxide (CO), hydrogen (H_2), methane hydrocarbons (C_nH_{2n+2}, including naphthane CH), and nitrogen (N_2). The method of taking the test material gas is explained by diagram illustrations of various samplers. Norms for vessels to be used and the method of measuring the test gas are given. Carbon dioxide, C_mH_n, O_2, and CO are to be measured by the absorption method, and H_2 and C_nH_{2n+2} are to be measured by the explosive method, slow combustion method, or combinations of these and the Palladium test tube combustion method. The procedure and the apparatus to be used for the quantitative determination of each element are explained by diagrams. Reagents and the operation procedures are also standardized. The method of calculating an average value from the test results is briefly explained.

16289 APTIC NO. 33815

FUME CONTROL OF THE ELECTRIC ARC FURNACE. *Brit. Steelmaker, 37(8):20, Aug. 1971.*

Arc furnace fume control brings together two major factors in modern steelmaking, the shift toward electric melting of scrap and the growth of legislation controlling pollution of the environment. For purposes of arrestment plant design, the standard of fume emission from steel refining processes may be taken as not more than 0.05 g/cu ft.

16290 APTIC NO. 34015

AIR POLLUTION CONTROL LAW. *(Taiki osen boshi-ho ni tsuite). Text in Japanese. Preprint, Japan Industrial Newspaper Co., Tokyo, 10p, 1971. (Presented at the Seminar on Air Pollution Control, Tokyo, Japan, Sept. 1971.)*

The present Air Pollution Control Law, issued in 1968, is based on the Laws concerning stack gas emission of 1962. Main points of revision are reviewed, and newly added pollutants, emission regulations, emission standards, fuel standards, particulate standards, automotive exhaust gas emission standards, emergency operations, treatment of stack gases from electric and gas factories, enforcement of laws, and progress reports are discussed. Localized emission standards of sulfur dioxide are: 0.020 ppm for the Tokyo-Yokohama area, Osaka-Amagasaki, Yokkaichi, and a few cities were newly added. Maximum permissible concentration is 0.022 ppm for Kashima, Chiba, Ichihara, Kurashiki, and few other cities of Akita and Shizuoka prefectures; 0.024 ppm for Muroran, Fuji, Nagoya, Himeji, Wakayama, northern Kyushu areas, and some parts of Hokkaido; and 0.027 ppm for Sapporo, Kawaguchi, Hatogatani, Kyoto, and some cities of Shikoku and eastern provinces. The largest maximum permissible concentration of SO2 is 0.045 ppm and this applies to all areas mentioned above and other areas where designated indexes are 0.030 to 0.040 ppm. Stack gas emission standards according to the new regulation are 0.05 to 0.10 g/N cu m for boilers using heavy oil and 0.20 to 0.40 g/N cu m for boilers using coal. Furnace emission standards are 0.05 to 0.10; rotary, roasting, sintering, and open hearth furnaces are 0.20 to 0.30; other heating, smelting, drying, cement, electric furnaces are 0.20 to 0.40; and incinerators are 0.20 to 0.70 g/N cu m. Special emission standard areas and toxic material emission standards are given.

16291 APTIC NO. 34063

Ministry of International Trade and Industry (Japan) Dept. of Thermal Power

THE CONTENT OF AIR POLLUTION CONTROL LAW REVISIONS AND THEIR APPLICATIONS FOR ELECTRIC WORKS. *(Taikiosen boshiho kaisei no naiyo to denki kosakubutsu ni okeru unyo). Text in Japanese. Karyoku Hatsuden (Thermolelectric Power Generation), 22(10):1107-1113, Oct. 1971.*

The 1970 revisions of public nuisance related laws are discussed with regard to purpose, content, application, and enforcement. The range of toxic pollutants was expanded to include cadmium and its compounds, chlorine and hydrogen chloride, fluorine and hydrogen fluoride, bromine fluoride, lead and lead compounds, and nitrogen oxides. Boilers using gases containing more than 0.1% sulfur content, coke furnaces, mineral depositories, mineral conveyors, crushers, graters, and sifters were added to the list of soot and dust creating facilities. Hydrocarbons, lead compounds, and nitrogen compounds were added to the list of toxic automotive emission gases. Emission standards are determined as before by the K figures obtained by the stack gas dispersion formula; but the entire country was divided into classifications according to various K values ranging from 11.7 to 26.3 (maximum allowable concentration of sulfur oxides 0.020 0.045 ppm). Soot and other dust particulate emission standards were revised on a large scale. Among electric power generator boilers, heavy oil and gas boilers were classified into three groups: Maximum allowable emission is 0.1 g/N cu m for boilers with more than 200,000 N cu m/h capacity; 0.2 g/N cu m for boilers between 40,000 and 200,000 N cu m; and 0.3 g/N cu m for boilers with less than 40, 000 N cu m/h capacity. These compare with the former 1.0 g/N cu m uniform standard. For low grade coal boilers, the maximum allowable concentration is 0.8 g/N cu m, and for high grade coal boilers, 0.4 g/N cu. Sulfur oxides standards and toxic pollutant emission standards are reviewed by tables.

16292 APTIC NO. 34154

British Standards Inst., London (England)

RECOMMENDATIONS FOR THE CONSTRUCTION OF SIMPLE SMOKE VIEWERS. *Brit. Standard, no. 2741, 12p., 1969. 1 ref.*

Two types of smoke viewers are described. In the first, a light is viewed through the flue gases and the appearance of the light itself is taken as an indication of the density of the smoke. This type is normally used in brick-set boilers. In the second type of viewer, a beam of light passes through the smoke onto an opalescent screen, the brightness of which gives an indication of the smoke density. This viewer may be used in most other boilers. The windows of the viewers are liable to damage by grit particles during soot blowing, making it necessary to protect them while the soot blowers are in operation. Cleaning should be carried out manually at least once per shift, and always after soot blowing. Diagrams of the viewers are given.

16293 APTIC NO. 34012

Campau, R. M.

LOW EMISSION CONCEPT VEHICLES. *American Petroleum Inst., New York, Div. of Refining, Proc. Am. Petrol. Inst., Div. Refining, vol. 51:241-243, 1971. (Presented at the Midyear Meeting, 36th, San Francisco, Calif., May 12-14, 1971.)*

A joint automotive and petroleum research program to develop prototype fuel and hardware requirements for low emission vehicle systems is described. The relevance of the very stringent emission targets established by the Inter-Industry Emission Control program on the overall improvement in ambient air quality for the Los Angeles Basin is illustrated giving reductions in nitrogen oxides, hydrocarbons, carbon monoxide, crankcase, and evaporative emissions. Three separate low emission concept vehicle systems targeted to meet the very stringent emission targets of the IIEC program are described. In addition, preliminary emission data are presented from a fourth low emission concept vehicle system which combines thermal reactors with catalysts, an exhaust gas recirculation system, and the emission hardware features of the three earlier systems. Vehicle fuel economy penalties and operating temperature problems are discussed, as well as the major problems with critical sub-system components. (Author abstract modified)

16294 APTIC NO. 33809

Knabe, Wilhelm

AIR QUALITY CRITERIA AND THEIR IMPORTANCE FOR FORESTS. METHODS FOR THE IDENTIFICATION AND EVALUATION OF AIR POLLUTANTS INJURIOUS TO FORESTS. *Preprint, International Union of Forest Research Organizations, Vienna (Austria), p. 129-150, 1971. 34 refs. (Presented at the International Union of Forest Research Organization, Congress, 15th, Gainesville, Fla., 1971.)*

In order to be precise, air quality criteria must be based on both criteria describing the effect and criteria describing the pollutant. Contrary to this concept, forest field investigations of the past were mainly concerned with the detection of damage, proof of its origin, and the assessment of the amount of damage or the area concerned. Sulfur dioxide damage to Norway spruce in the Erzgebirge mountains provides an example to show the possible contributions of forest science to the establishment of air quality criteria. After having collected abundant data for air quality criteria the next step must be to estimate the risks of certain levels of pollution.

16295 APTIC NO. 34100

Love, G. J.

AIR POLLUTION INFORMATION PERTINENT TO THE CARIBBEAN. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C. and American Inst. of Chemical Engineers, New York, 29p., 1971. (Presented at the Technical Environmental Conference, 1st, San Juan, Puerto Rico, 1971.)*

National primary and secondary ambient air quality standards are given for sulfur dioxide, particulates, carbon monoxide, photochemical oxidants, hydrocarbons, and nitrogen dioxide. The primary standards define air quality levels judged necessary, with an adequate margin of safety, to protect public health. The secondary standards define levels necessary to protect public welfare from any known or anticipated adverse effects of a pollutant. Also included are initial lists, issued by the Environmental Protection Agency, of hazardous substances for which no ambient air quality standard is applicable and of five categories of stationary sources that contribute significantly to atmospheric pollution. Emission standards are to be promulgated for the hazardous substances (asbestos, beryllium, mercury) and for the stationary sources (contact sulfuric acid plants, large fossil fuel-fired steam generators, nitric acid plants, Portland cement plants, and incinerators of more than 2000 lb/hr charging rate. By regulating population growth, industrial development, and number of automobiles, the Caribbean could control pollution problems before they get out of hand.

16296 APTIC NO. 34141

Lyublina, E. I.

DETERMINATION OF PRELIMINARY MAXIMUM PERMISSIBLE CONCENTRATIONS (BY CALCULATION) OF ORGANIC SUBSTANCES IN THE AIR OF WORK PREMISES. *Gigiena i Sanit., 25(12):20-25, 1960. 6 refs. Translated from Russian, 8p., 1960.*

The use of formulas to determine preliminary maximum allowable concentrations of organic substances in the air of industrial plants is examined. Based on comparison of the maximum allowable, lethal, and narcotic concentrations with the vapor pressure and boiling point of each substance, the formula expressing maximum permissible concentration as a function of the boiling point and the one based on lethal concentration was tested. The difference between the results of the two calculations indicated the significance of the toxicity of the substance.

16297 APTIC NO. 33730

Parkinson, G. S.

LEAD IN GASOLINE. 3--UK LEVELS. *Petrol. Rev., 25(296):289-290, Aug. 1971.*

The lead levels and octane numbers for motor gasoline for each year between 1960 and 1970 are tabulated, derived from information by suppliers who are responsible en masse for about 90% of gasoline sales in the United Kingdom. Annual UK sales for each grade of gasoline and the average lead levels for all UK sales of the various grades for the period 1960-1970 are included. Since the appearance of BS 4040 Specification for Petrol for Motor Vehicles in 1967, no product sold in the UK has had a lead content in excess of 3.8 g/imperial gal.

16298 APTIC NO. 34153

British Standards Inst., London (England)

SPECIFICATION FOR SMOKE DENSITY INDICATORS AND RECORDERS. *Brit. Standard, no. 2811, 16p., 1969, 1 ref.*

Instruments based on obscuration of a light beam in a flue for giving a quantitative indication of the optical density of smoke passing through the flue are defined. An alarm device may be incorporated to give warning when a set reading of density is exceeded. The equipment may comprise flue-mounted components (usually a projector and receiver) and control equipment including transformers, amplifier, and a means of voltage stabilization. The apparatus should operate an indicating meter, calibrated in percentage obscuration, optical density, or both. The equipment may also include a recorder, an alarm actuating device, and external alarm devices. It should be designed to operate with a light beam length through the smoke from 0.3 m up to 6 m. Other requirements and specifications and the installation of smoke density meters were given.

LEGAL AND ADMINISTRATIVE

16299 APTIC NO. 33325

Executive office of the President, Washington, D. C., Energy Policy Staff

ELECTRIC POWER AND THE ENVIRONMENT. *71p., Aug. 1970.*

Present institutional arrangements and stand setting considerations, new institutional arrangements, transmission lines and utility corridors, acquisition of plant sites, research and development to alleviate problems of power plant siting, and considerations affecting the growth of electricity consumption were presented. Fossil fueled electric plants discharge almost 50% of the sulfur oxide pollutants, 25% of the particulates, and approximately 25% of the nitrogen oxide emissions in the United States. It is estimated that by 1980, unless control measures are applied, some 50 million tons of sulfur dioxide would be released annually from all sources and 36 million tons of the total would be discharged from power plants. The plant emissions of most concern are fly ash, sulfur dioxide, radioactive releases, and large quantitites of low level heat. Electrostatic precipitators are almost universally used for high efficiency removal of fly ash. However, adequate removal of sulfur oxides on a large scale on a reliable basis has not yet been demonstrated. Research was recommended on flue gas desulfurization processes, coal washing to remove pyritic sulfur, coal gasification, single stage fluidized bed combustion, and fluidized bed gasification followed by combustion in a conventional boiler to remove sulfur contained in the fuel, upgrading of electrostatic precipitators, and the development of fabric filters and wet scrubbers as alternatives to electrostatic precipitators for fly ash control. Legislation, plant site planning control agencies, and state regulations are also mentioned.

16300 APTIC NO. 33389

AN AIR POLLUTION MEASURING NETWORK IN THE RHINE ESTUARY NEAR ROTTERDAM. *(Ein Messnetz fuer Luftverunreinigung im Rheinmuendungsgebiet bei Rotterdam). Text in German. Schweiz. Tech. Z., 68(8):165-167, Feb. 1971.*

Thirty-one automatic monitoring stations, registering atmospheric sulfur dioxide concentration as an indicator of overall pollution 64 times an hour, are stationed throughout the area of the Rhine estuary near Rotterdam. A measuring cell kept at a constant temperature (35 C) containing a solution of potassium bromide, sulfuric acid, and bromine which interacts with SO2 measures the redox potential by means of two electrodes and compares it with the potential of a reference electrode. The bromine concentration in the cell is automatically kept constant by a generator electrode which is activated by shifting the bromine-bromide equilibrium through interaction with SO2. The intensity of the generator current is proportional to the used quantity of bromine and thus to the quantity of SO2 which in a unit of time passes through the cell. The levels measured are automatically relayed to a computer which yields 31 median hourly levels. These levels, compared to corresponding levels 24 hours earlier, yield a trend in the SO2 level in each station. If these levels exceed a stipulated threshold level, the computer automatically sounds an internal alert which is followed by an external alert to the industry which reacts by restricting its operations. This monitoring system has been instrumental in a marked reduction of air pollution in the area; the nitrogen oxide level has been stabilized in spite of the fact that industrial activity has doubled. A contributory factor was the switch from heavy fuel oil to natural gas and to oil with a low sulfur content.

16301 APTIC NO. 33566

National Inst. of Environmental Health Sciences, Research Triangle Park, N. C., Task Force on Research Planning in Environmental Health Science

AIR POLLUTION. *In: Man s Health and the Environment -- Some Research Needs. Part II. Recommendations for Research on Specific Environmental Problem Areas. Chapt. 1, p. 23-39, 1970. 28 refs.*

Recommendations for research on the effects of air pollution are outlined with special attention to community studies, studies in experimental animals, and laboratory studies involving man. The need for epidemiological studies is underlined. Discussions of problems of exposure measurement cover sampling designs (tissue measurement and personal sampling), sampling frequency, needs for improvement, and data summarization and interpretation. Method standardizations are examined for mortality and morbidity. The purposes of research with animals and acceptable laboratory studies of human beings, including research considerations, are discussed. Recommendations for research in these fields are included.

16302 APTIC NO. 33627

LONG-RANGE PLANNING BY INDUSTRIAL ENTERPRISES AND ENVIRONMENTAL PROTECTION. *(Langsfristige Unternehmungsplanung und Umweltschutz). Text in German. Technica, 20(20):2005-2006, 1971.*

Industrial enterprises are now making long-range plans for environmental protection. Processes with less risk of air pollution are given perference. Measures for protecting the environment are being taken on the local, national, and international level. On the international level, action is just beginning to gain momentum. The North Atlantic Treaty Organization, for instance, is trying to coordinate national programs for clean cars. In Japan, this problem has been solved with a Wankel engine with an afterburner. Use of this car would reduce air pollution by 90%. Measures on the national level are more entensive, with agencies for protection against emissions in operation. Local measures have been so efficient that pollution is less than five or 10 years ago.

16303 APTIC NO. 33631

FUEL SUPPLY, CLEAN-AIR RULES TO COLLIDE. *Oil Gas J., 69(39):56-57, Sept. 27, 1971.*

Of the 11 million people in New England, 75% now use No. 2 fuel oil as a source of heat. Conversion of schools and industries from residual to the lower sulfur No. 2 will raise the area s share, already 21.2%, of the national market for this product. On the East Coast, the demand for low-sulfur oil will grow from 269.5-million bbl in 1971 to 420.5 million in 1975. Demand for 0.3% sulfur residual oil will reach 91.1-million bbl in 1972 and 132.5 million in 1975. Demand for one percent maximum sulfur content will decline from 132.7-million bbl in 1972 to 159 million in 1975, as fulfur rules become more stringent. These regulations will distort the demand for No. 2 fuel oil upward, because of use for this fuel in blending with residual oil to meet sulfur limits on the heavy product. Refiners will be pressed to meet the regulations in specified time limits because of limited desulfurization capacity and the shortage of low-sulfur crude oil.

16304 APTIC NO. 33722

Tokyo Metropolitan Equipment and Supplies Bureau (Japan), Air Pollution Regulation Project

STANDARD REGULATION FOR THE TREATMENT OF POISONOUS GASES (1). *(Yugai gasu shorishisetsu shido hyojun (1)). Text in Japanese. 186p., March 1970.*

A standard regulation was established for treating generated poisonous gases in Tokyo. A packed tower or the combination of packed and spray towers should be used for the treatment of ammonia gas. Gas-liquid contact equipment may be used to wash gas provided it is equal to or higher than the towers in control efficiency. Maximum ammonia concentration in waste gas was determined at 500 ppm; average concentration during manufacturing was 250 ppm. For reference purposes, gas cleaning apparatus, absorption of waste gas, analysis of waste gas and drained water, standards for regulation of waste gas from a factory, and the standard of the treatment of drained water from a factory were described. Fluorine and fluoric compounds should be treated by washing with a jet scrubber or spray tower. Maximum fluorine concentration was set at 15 ppm and average concentration during manufacturing was 10 ppm. General properties of fluoric compounds, sources of fluoric compounds emissions and examples of equipment for treating gases containing fluorine are examined. Hydrogen sulfide should be treated with the aspiration system of a tower using alkali. Maximum H2S concentration in waste gas, was set at 50 ppm, 30 ppm was the standard average during manufacturing.

16305 APTIC NO. 33856

Central New York Regional Planning and Development Board, Syracuse

AIR POLLUTION CONTROL. *In: Environmental Services and Utilities Inventory. HUD Proj. NYP-160, Inventory Rept. 6, p. 42-53, Dec. 1969. 26 refs.*

NTIS: PB 195878

An inventory of pertinent legislation, a discussion of air quality standards, objectives, and administration of control, monitoring, and enforcement programs was presented for the Central New York Region. Legislation pertinent to the control and abatement of air pollution include regulations to prevent new pollution, statewide control of contaminant emission from processes and exhaust and ventilation systems, control of emission from coke ovens, elimination of open air burning of refuse, limits on smoke emissions from diesel engines, and emission limits for incinerator installations. The Public Health Law, the Tax Law, and the Real Property Tax Law were amended to provide tax relief to encourage the construction of air pollution control facilities. Five tolerability levels of air contamination were defined which relate to the macro-population density and related economic development. Each level is also defined as to the numerical weight-volume limits for particulates, gases, and vapors which can be tolerated within that level. A monitoring program is maintained which is a combination of a continuous, automatic system which is centralized in Albany, and a series of manual monitoring stations located throughout the state. The stations are equipped to record not only specific pollutants but also meteorological data, so that the system will act as an alerting and warning system for weather conditions which worsen air pollution.

16306 APTIC NO. 33940

Ministere de l Equipement et du Logement de la Republique Francaise (France)

LIMITATION OF THE PERCENTAGE OF CARBON MONOXIDE AND THE COMPOSITION OF EXHAUST GAS EMITTED BY IDLING AUTOMOBILES. DECREE OF MARCH 31, 1969. *(Limitation de la teneur en oxyde de carbone au ralenti et composition des gaz d echappement emis par les vehicules automobiles. Arretes du 31 Mars 1969). Text in French. Centre Interprossionnel*

Technique D Etudes de la Pollution atmospherique, mise au Courant Documentaire (Paris), no. 30:492-1-492-2, Jan. 1, 1969 (?).

The two decrees apply to automobiles equipped with a four-stroke gasoline engine of a total weight not exceeding 3.6 t and of power smaller than one CV. The first decree stipulates the maximal permissible carbon monoxide emission level for idling engines. The CO content in exhaust gases must not exceed 4.5% by volume, which is applicable to new vehicles beginning Sept. 1, 1969 and to vehicles registered since Jan. 1, 1960 beginning Jan. 1, 1970 with a tolerance of one percent up to Jan. 1, 1971. The second decree stipulates the maximal permissible emission levels of CO and of hydrocarbons for the above engines. Maximal permissible emission levels range from 100 to 220 g CO and hydrocarbon levels from eight to 12.8 g for inertia equivalents of from 680 to 2270 kg. The test conditions on a dynamometric bank are described.

16307 APTIC NO. 34033

Bermingham, P. E.

CURRENT EMISSION STANDARDS AND THE PETROLEUM INDUSTRY. *American Petroleum Inst., New York, Div. of Refining, Proc. Am. Petrol. Inst. Div. Refining, vol. 51:587-610, 1971. 86 refs. (Presented at the Midyear Meeting, 36th, San Francisco, Calif., May 12-14, 1971.)*

Environmental laws and regulations applicable to petroleum refining are discussed from a legal point of view. Effluent discharges as affected by the Water Pollution Control Act and its amendments are discussed, as well as oil spills affected by the Water Quality Improvement Act of 1970 and impediments to navigation affected by the Refuse Act of 1889. Pending 1971 water pollution amendments are indicated. Refinery emissions into the ambient air as affected by the Clean Air Act and its amendments are considered. National standards are cited for major pollutants and new stationary sources. Fuel composition including lead in gasoline is discussed. Citizens suits, noise, odors, flares and glares, and thermal pollution are mentioned. (Author abstract modified)

16308 APTIC NO. 33777

Bibbero, Robert J.

SYSTEMS APPROACH TOWARD NATIONWIDE AIR-POLLUTION CONTROL. I. THE PROBLEM THE SYSTEM, THE OBJECTIVE. *IEEE (Inst. Elec. Electron. Engrs.) Spectrum, 8(10):20-31, Oct. 1971.*

Despite congressional approval of the Clean Air Act in 1963, air pollution control is suboptimal because it is fragmented, insufficiently coordinated, and fails to achieve economies of scale and control of the free use of air by polluters. The solution may lie in a nationwide control system encompassing new and old political activities, technical functions, and public and private organizations, all affecting in some way the status of the air environment and of the animate and inanimate receptors. Operating functions of the system would be identification, prediction, and control. These functions are discussed, together with near-term and long-term constraints limiting the degree of control possible. A mature system with funding measured in billions of dollars will have overcome most of the technical, political, and social restraints. Such a second-generation system will have only four functions: monitoring current pollutant levels; forecasting and predicting future trends and steady-state levels; exerting effective control and abatement; and preventing dangerous episodes by quick reaction control. The optimum degree of control will correspond to the minimum total costs. This will be achieved when marginal costs -- the slopes of the effects and control cost curves -- are equal.

16309 APTIC NO. 34281

Brabander, L. de and R. Dielman

REGULATIONS TO FIGHT AIR POLLUTION BY GASOLINE ENGINES IN EUROPE: GENERAL TRENDS. *(Maat regelen ter bestriding van de lucht verontreiniging door benzine motoren in Europa; Algemene tendensen). Text in Dutch. Ingeniursblad, 40(15-16):436-438, Aug. 1971.*

General trends in reducing air pollution from automobile engines in Europe are discussed. Regulations of the Bureau of Automobile Constructors (PBICA), are used by France, Czechoslovakia, and the European Economic Community. Exhaust emissions of automobile engines were measured experimentally. Effects of oil temperature, r.p.m., and mixing of air on the emissions are described. Special automobile inspection stations for measurement and control of combustion are suggested.

16310 APTIC NO. 33414

Breidenbach, Herbert

THE AUTHORIZATION PROCEDURE FOR POWER PLANTS OPERATED WITH FOSSIL FUELS AND THE EFFECTS ON THE ECONOMY. *(Das Genehmigungsverfahren bei Kraftwerken mit fossilen Brennstoffen und Auswirkungen auf die Wirtschaftlichkeit). Text in German. Tech. Ueberwach. (Duesseldorf), 12(10):288-296, Oct. 1971. 49 refs.*

Numerous conditions primarily pertaining to protection of the environment must now be fulfilled for permission to build a fossil fuel-fired power plant. Very high stacks are required for more effective dilution of waste gases. Ground needed for the stacks, as well as for the required desulfurization plant, has doubled the space requirement of power plants. Compact construction is no longer feasible. A seven year program for the reduction of pollution by power plants is now almost completed. Improvement methods include a switch to other fuels, better stacks and filters, and the closing down of old plants. By 1968, dust emissions had been reduced by more than 78% from 1964, and sulfur dioxide emissions by more than 25%. At the same time the output increased by 2.3 fold.

16311 APTIC NO. 33826

Chiagouris, George L.

HOW TO LIVE WITH THE NEW INCINERATOR CODES. *Plant Eng., 25(21):118-119, Oct. 14, 1971.*

Under the new City of Chicago codes on incineration, multichamber incinerators with gas burners in each chamber, and capable of maintaining 1400 F in the secondary chamber, are acceptable. In high-density residential areas and downtown, the incinerators must be equipped with adequate control devices to keep pollutants within the emission limits prescribed in the environmental control ordinance. New designs with sealed combustion chambers, after-burners, forced air and/or starved air systems are also permitted. A procedure is outlined to determine whether an incinerator complies with regulations.

16312 APTIC NO. 33556

Croke, Edward J., Kevin G. Croke, and Allen S. Kennedy

INTEGRATING AIR RESOURCE MANAGEMENT WITH URBAN AND REGIONAL PLANNING. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 47p., 1971. 18 refs. (Presented at the Air Pollution Control Association Annual Meeting, 64th, Atlantic City, N. J., June 27-July 2, 1971, Paper 71-146.)*

The state-of the-art of some of the more critical sub-assemblies which would be integrated within a comprehensive environmental planning model is reviewed, including the econometric models for regional demand for goods and services; multisectorial demographic models which describe major shifts in regional population; land use and spatial allocation models which describe the distribution of industrial, commercial, and residential activity; regional resource distribution models; transportation demand models which simulate trip generation and distribution; and waste production, generation, and distribution models used to simulate the emissions and dispersion of sulfur dioxide and particulates due to industrial, residential, and commercial fuel burning. The use of such regional, resource, and land use models in conjunction with the more traditional simulation techniques of air resource management planning is considered, and the development and testing of a pilot version of a computerized air resource management plant evaluation system, based on land use and designed to provide an interface between conventional air pollution control planning and regional planning, is described. (Author abstract modified)

16313 APTIC NO. 33544

Durand, M.

POLLUTION. LAWS, DECREES, AND REGULATIONS. RESUME AND COMMENTS. *(Pollution atmospherique. Lois-decrets et reglements. Resume et commentaires). Text in French. Preprint, Association Technique de la Siderurgie Francaise, Paris (France), Commission Eau et Polution Atmospherique, 13p., 1967. (Presented at the Association Technique de la Siderurgie Francaise, Commission Eau et Pollution Atmospherique Meeting, April 11-12, 1967, CT/MTP Service 526 No. 67-456.)*

In a project of the Water and Air Pollution Commission of the Technical Association of the French Steel Industry, pollution control laws, decrees, and regulations are noted promulgated by various departments of the French government concerning dangerous, unhealthy, or offensive industrial establishments, and including the circular dealing with sampling of smoke emissions and related matters. Since the establishment of the Commission, the problem arising from water and air pollution has been developing in two directions. On the one hand specific controls, which have been imposed and are being enforced by specialized control agencies, are becoming more effective. On the other hand, strict enforcement of theoretical postulates has, on the practical level, brought about a situation endangering the competitiveness of the industry because of the high costs of control installations. A compromise must be reached between the desirable and the possible while recognizing that pollution is a real problem for which the steel industry cannot deny responsibility.

16314 APTIC NO. 33842

Firnhaber, R. B.

LEGAL QUESTIONS CONCERNING ENVIRONMENTAL PROTECTION. *(Rechtsfragen des Umweltschutzes). Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), 25(41):1; 4, Oct. 1971.*

The University of Kaiserslautern will focus its scientific activites on environmental protection. All institutes will participate in environmental problems. The department for architecture will deal with questions of planning and design. The department of mechanical engineering will deal with air pollution primarily with cleaning of waste gases produced by combustion processes. The University wanted to inform the public on its activities in this field with a Congress on Legal Questions concerning Environmental Protection. Present legislation places the property into the service of environmental protection. The Federal Court has decided that land can be set aside as recreation area without the agreement of the owner, if the density of the population and the air pollution situation requires a green belt. Also, all efforts in the legislature are directed toward uniform laws concerning environmental protection in all states.

16315 APTIC NO. 34159

Gaboriault, Andrew L.

INCENTIVES AND DETERRENTS OF INDUSTRIAL PROPERTY WITH RESPECT TO TECHNOLOGICALLY INNOVATIVE SOLUTIONS. *George Washington Univ., Washington, D. C., PTC Research Inst., Conf. Air Water Depollution: Roles Ind. Prop., Innovation and Competition, Washington, D. C., 1970, p. 21-54. (March 31.)*

The patent system provides the individual or the company who successfully develops an antipollution system with the hope that he will have an opportunity to capitalize on his success by sale or licensing. The only problem in the application of the patent laws to the air pollution field revolves around government regulation. When government regulation prescribes the identity of or sets limits on parts of the overall system rather than on the results which are achieved, it imposses requirements that do not necessarily relate to the most economic overall solution. The record of an extended audience discussion is included.

16316 APTIC NO. 34173

Gasparik, Tabor

EVIDENCE AND OTHER PHOTOGRAPHY IN AIR POLLUTION CONTROL. *J. Evidence Photo., 3(1):4-8, Jan. 1971.*

Possible uses of photographic information in the field of air pollution control include the following: use as legal evidence; use in persuading individuals to clean up; public information and education; fact finding for new regulations; and fact finding to determine progress. The present level of usage of photographic equipment by Air Pollution Control Agencies operating on a full-time basis is discussed. This information is coordinated to indicate various areas in which photographic equipment and techniques can be effectively utilized.

16317 APTIC NO. 34140

Georgevich, Maurice and George A. Jutze

INTRODUCTION. *In: Interstate Surveillance Project: Measurement of Air Pollution Using Static Monitors. Air Pollution Control Office, Research Triangle Park, N. C., Interstate Surveillance Project and Resources Research, Inc., APCO Pub-APTD-0666, p. 1-8, May 1971.*

NTIS: PB 200519

The Interstate Surveillance Project is reviewed with respect to objectives, data limitations, network, and station locations. Sampling site locations were classified into residential, commercial, industrial, and rural areas. The network consisted of regular monitoring stations, Continuous Air Monitoring Program stations, which measured sulfur dioxide, nitrogen oxides, carbon monoxide, methane, and hydrocarbons, experimental stations, and background stations.

16318 APTIC NO. 33740

Hartkopf, Guenter

ASPECTS OF THE FEDERAL GOVERNMENT CONCERNING THE POLICY ON ENVIRONMENTAL PROTECTION. *(Aspekte der Bundesregierung zur Umweltschutzpolitik). Text in German. Staedtehygiene (Uelzen/Hamburg), 22(10):225-226, Oct. 1971. (Presented at the Arbeitsgemeinschaft Bonner Aerzte fuer Umweltschutz, 2nd Scientific Meeting, March 24, 1971.)*

The present state of measures taken by the German Federal Government for protecting the envrionment is encouraging. A draft of the law for limiting the lead content of gasoline has been put before the German Bundestag. A draft for a federal emission protection law has been completed in the Department of the Interior. Experts look at the function of a Federal Institution as protecting against emissions and other institutions as protecting the environment. The federal government is determined to give the improvement of environmental quality priority over economic growth. Considering the complexity of the problems involving environmental pollution which range from lead contamination by automobile exhaust gases to possible climatic changes through carbon dioxide, the German Federal Government makes use of experience gained in these fields on the international level.

16319 **APTIC NO. 33839**

Haskell, Elizabeth H.

STATE GOVERNMENTS TACKLE POLLUTION. *Environ. Sci. Technol., 5(11):1092-1097, Nov. 1971.*

While the federal government is moving toward national pollution control standards, the new consolidated state environmental agencies, with their increased emphasis on pollution regulation, may have a stronger role in the daily implementation of standards, through permit processes, surveillance, and enforcement actions. Illinois, Minnesota, Washington, Wisconsin, and New York provide variations on the theme of state program reorganization, designed to achieve a comprehensive approach to environmental problems. A first step agreed on in each state was to shift pollution control responsibilities out of the health department to broaden antipollution concerns beyond health and to increase the state s emphasis on legal regulation. Benefits of the reorganization are cited. Furthermore, by reducing the proliferation of part-time boards and commissions, it was hoped to make state government more manageable and more responsive to the governor. Land use control, a waste management agency, courts, and the citizen suite are mentioned.

16320 **APTIC NO. 33672**

Henz, Donald J. and Richard W. Gerstle

THE PLANT ENGINEER AND AIR POLLUTION CONTROL. *Factory, 4(10):35-36, Oct. 1971.*

A plant engineer should know the effect of the Clean Air Act and generic types of emission control regulations. The Act effectively brings every area in the U. S. within the scope of air quality management. It gives the administrator of the Environmental Protection Agency the right to publish regulations giving ambient air quality standards including emission or equipment standards. These performance standards are applicable to all sources constructed or modified after promulgation of the standards. The operator of a new or modified source can be required to keep records, make reports, and monitor and sample for emissions. His plant can be entered for inspection and testing of the exhaust stream. Where a state fails to enforce emission standards, the Clean Air Act provides for federal enforcement. Generic types of regulations pertain to particulate matter, gaseous emissions, odor, visibility, and equipment specifications. New particulate regulations are based on the total allowable amount emitted per hour. The allowable rate is determined by the types of control equipment available for various sources or types of combustion sources in an area. Gaseous emission rules vary according to area problems. Thus, in cities where large amounts of coal or oil are burned, the emphasis is on sulfur dioxide. Since visibility regulations do not present a quantitative emission limit, they are among the most difficult for the plant engineer.

16321 **APTIC NO. 33817**

Ireland, F. E.

CLEARING THE AIR. *Clean Air, 1(2):6-17, Summer 1971.*

The history of the Clean Air Acts and the Alkali inspectorate in Great Britain is reviewed. Since the Clean Air Act of 1965, smoke emissions have been reduced so that average ground level concentrations in urban areas have decreased by 60%. Sulfur dioxide concentrations at ground level have also been reduced, but to a lesser extent. The work of the inspectorate is considered with respect to acid droplets, fumes and mists, and oxides of nitrogen. Emissions and control methods are also discussed for the iron and steel industry, electricity works, ceramic works, and gas and coke works. The special problem of sulfur dioxide is considered. Recent developments with fluidized combustion of coal or oil in the presence of dolomite are promising in preventing emissions of SO2.

16322 **APTIC NO. 33461**

Kassasow, P.

THE ACTIVITY OF THE PUBLIC HYGIENE SYSTEM IN THE PEOPLE S REPUBLIC OF BULGARIA IN THE FIELD OF THE HYGIENE OF AIR. *(Taetigkeit der Hygieneinspektion in der ,VR Bulgarien auf dem Gebiet der Lufthygiene). Text in German. Wiss. Z. Humboldt Univ. Berlin Math. Naturw. Reihe, 19(5):545-547, 1970.*

The concentration of industry in some areas of Bulgaria has brought about a considerable degree of air pollution because of incorrect plant siting, outdated production methods, the lack of effective means dust removal and gas purification, and use of raw materials in ferrous and non-ferrous industries which contain a high percent of ashes, sulfur, and other polluting substances. A particularly serious situation prevails in areas where power stations, metallurgical plants, and cement factories are located, all of which use solid fuels. In 1966 a network of state-operated institutes of hygiene was created. These institutes conduct systematic studies of existing conditions and advise on proposed control measures. Industrial building projects must be approved by the institutes whose staffs include technical experts from various fields and physicians. A card index of available anti-pollution devices has been developed. The institutes have also laboratories for air hygiene. Specific recommendations for purification programs for the various industrial areas are submitted to the Ministerial Council in Sofia for study and approval. Substantial investments for such purposes have been approved since 1968. Two five-year plans, for 1971-75 and 1976-80, being prepared concern purification of water, air, and soil. The Institute for General and Communal Hygiene of the Academy of Medical Sciences in the USSR is acting in an advisory capacity in connection with these efforts.

16323 **APTIC NO. 34161**

Lamb, George P.

ANTITRUST FACTORS INVOLVED IN SANCTIONING JOINT OR COOPERATIVE ACTIVITIES AMONG PRIVATE PARTIES. *George Washington Univ., Washington, D. C., PTC Research Inst., Conf. Air Water Depollution: Roles Ind. Prop., Innovation and Competition, Washington, D. C., 1970, p. 97-110. 3 refs. (March 31.)*

There will be no cooperation among industries to seek methods of pollution control so long as the shadow of antitrust prosecution hangs over any such efforts. On January 10, 1969, a complaint was filed against the Automobile Manufacturers Association and the four major U. S. automobile manufacturers charging them with a violation of Section 1 of the Sherman Act by reason of their cooperation in attempting to develop motor vehicle air pollution control equipment. A limited antitrust exemption is proposed for antipollution projects undertaken cooperatively by industry.

16324 **APTIC NO. 33844**

Langmann, R.

ENVIRONMENTAL PROTECTION FROM THE VIEWPOINT OF THE CITY MUEHLHEIM-RUHR. *(Umweltschutz aus der Sicht der Stadt Muehlheim Ruhr). Text in German. Oeffentl Gesundheitswesen (Stuttgart), 33(10):658-665, Oct. 1971. 18 refs.*

The sources for air pollution in the city Muehlheim-Ruhr are domestic heaters, automobiles, and industry. While the carbon monoxide fraction in waste gases from power plants is one percent, it is three percent at domestic heaters and fluctuates between 0.05 and 13%. A fraction of five percent CO in the hemoglobin lowers the ability to concentrate. Such COHb values can be expected to accumulate during driving in busy streets. In Muehlheim-Ruhr some values have been measured which exceeded 50 ppm. Another pollutant emitted by automobiles, lead, has been found in a concentration of 0.55 mg/sq m/day. No higher lead concentration in the blood of the population in the city has been recorded. Also, 120 mg/sq m/day of zinc has been determined in one section of the city. After the installation of cloth filters, the zinc concentration sank to 0.5 mg/day/sq m. The sulfur dioxide emission has been reduced in Muehlheim-Ruhr by a switch to natural gas. The SO2 concentration measured in this city was 0.21 mg/cu m. A lower ultraviolet radiation was measured in the hazy industrial city of Muehlheim-Ruhr than in neighboring Bielefeld with no industry. Possibilities for assuring environmental protection are discussed with emphasis on health officials, medical personnel, and control agencies.

16325 APTIC NO. 34058

Lanteri, Annemaree

THE PHILOSOPHY OF AIR POLLUTION LEGISLATION. *Clean Air, 4(3):45-46, Sept. 1970.*

The increase in the number of sources and the rate of atmospheric pollution resulting from the development and expansion of technology has highlighted the inadequacy of private litigation as a means of air quality control in the twentieth century. Growing public concern over readily apparent pollution, coupled with a series of disasters which have resulted in considerable loss of life and property damage, have put pressure on governmental bodies to turn their attention to the legal control of atmospheric pollution through specific legislative programs. Legislation which aims at effective control must balance the social desirability of encouraging progress with the requirements for a healthy and aesthetically satisfying civilization. The precise method of control and abatement chosen by any particular state or country will depend upon its political and administrative structure, its economic progress, and degree of industrialization. There are two basic methods of legislative control which reflect a different emphasis in the philosophical aims of such legislation. The first sets out to balance progress with clean air requirements and the second strictly prohibits pollution virtually without reference to cost.

16326 APTIC NO. 33572

Lawyer, Robert F. and Carl G. Beard, II

WEST VIRGINIA S NEW CONCEPT IN REGULATING PARTICULATE MATTER FROM MANUFACTURING PROCESSES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 21p., 1971. (Presented at the Air Pollution Control Association, Annual Meeting, 64th, Atlantic City, N. J., June 27-July 2, 1971, Paper 71-18.)*

The concepts and development stages employed in West Virginia s Regulation VII, which limits the emission of solid and liquid particulate matter from manufacturing process operations within the State, are described. Concentration, collection efficiency, production output, and process weight standards are reviewed as well as the use of a modified process weight type standard in the Regulation. This modification is manifested in a unique duplicate source concept with several allowable emission rate curves for different industrial categories rather than the more conventionally used unit approach with a single curve. The duplicate source approach involves entering the process weight versus allowable emission rate curves with the total process weight input of all like units within a plant boundary rather than with each unit separately. Due to the potential restraint on industrial growth of the duplicate source approach, an expansion formula used in the Regulation, and its derivation, are discussed. This method of applying a process weight rule is workable and with appropriately designed emission rate curves can provide for strict control0 of large multi-unit plants necessary to achieve the particulate matter ambient air quality standards proposed by the Environmental Protection Agency. In addition, this control strategy provides for a minimization of the economic equity between competing industries of similar size, with different combinations of the same manufacturing processes. (Author abstract modified)

16327 APTIC NO. 34002

Lieberman, Joseph A. and James R. Janis

ENVIRONMENTAL PROBLEMS AND NUCLEAR CHEMICAL ENGINEERING. *Chem. Eng. Prog. Symp. Ser., 66(104):142-147, 1970.*

The techniques and methodology of nuclear chemical engineering, specifically the application of systems analysis, can contribute to the solution of environmental problems. In the solid waste management area alone, the application of nuclear engineering principles ranges from the materials cycling and recycling concept to the delineation of unit operations and process requirements to the application of mass and energy transfer theories to specific aspects of solid waste management technology. The Bureau of Solid Waste Management will use systems analysis to evaluate a fluidized bed incinerator that burns solid waste at high pressure to produce hot gases to power a turbine-generator. Other federal research programs concern air pollution control, occupational safety, and health effects of pollutants. In the area of air pollution control, priority is being given to technology for controlling pollutants from combustion of fossil fuels and from motor vehicles. Programs in flue gas desulfurization, fuel conversion, fluid bed combustion, and new concepts in power cycles are aimed at further reducing emissions from power plants. A token program is under way involving alternate vehicle power systems.

16328 APTIC NO. 33420

Locuoco, Albert W.

A CASE FOR AIR POLLUTION CONTROL IN CLEVELAND. *Wire J., 4(10):46-47, Oct. 1971. (Presented at the Wire Association, Annual Meeting, Cleveland, Ohio, Oct. 18, 1971.)*

The prime concerns today of Cleveland s Division of Air Pollution Control are the effects produced on man and his property by local and regional changes in the physical and chemical characteristics of our air due to the discharge of pollutants. In 1962 a completely new and revised Code was passed after six months of public hearings. This 1962 Code established emission levels for particulate matter, Ringelmann and opacity tests for fuel burning, equipment, metallurgical operations, and incinerator emissions. The 1969 Code contains both interim standards and new installation standards of emissions. The Code is very specific regarding the duties of the Commissioner, while it also includes chapters on permits and fees. Development of an Ordinance, surveillance activities, and a control strategy model are also discussed, as well as the budget and recent organization of the Division of Air Pollution Control.

16329 APTIC NO. 34170

Lundholm, B. and S. Svensson

GLOBAL ENVIRONMENTAL MONITORING SYSTEM. *Technical report from Sweden to the IBP-Committee on Global Monitoring. Swedish Natural Science Research Council, Stockholm, Ecological Research Committee, Bull. 10, 64p., 1970.*

Possibilities of establishing monitoring activities to follow environmental changes on a global scale are considered. For convenience, the biosphere is separated into the atmosphere, hydrosphere, and pedosphere. Recommendations are made concerning the most informative parameters for showing secular trends by monitoring. Living organisms are briefly considered under the headings organosphere and biological parameters. The structure of an environmental monitoring system is discussed, including stations and remote sensing. Organization of the system, planning and implementaion, and costs are considered.

16330 APTIC NO. 33558

Marlow, Sidney, James Better, and Eric Seiffer

EXPERIENCE WITH NEW YORK STATE S AIR POLLUTION CONTROL RULES AFFECTING PROCESS, EXHAUST AND VENTILATING SYSTEMS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 21p., 1971. (Presented at the Air Pollution Control Association, Annual Meeting, 64th, Atlantic City, N. J., June 27-July 2, 1971, Paper 71-7.)*

New York State s primary air pollution control rule for industry, in effect since February 6, 1968, called for compliance of existing installations by January 1, 1971. In 1966 several legislative constraints were removed, permitting a statewide emission regulatory approach. In addition to the enactment of specific emission rules for smoke, open fires, and fuel sulfur restrictions, a general process emission rule was enacted which provides varying degrees of control for various process sources and community needs. Ambient air quality is one of several factors considered in determining the level of allowable emissions permitted from a source, another is the environmental rating, defined in terms of effects, assigned to a process source: A for an adverse effect on the environment; B for a moderate or localized effect; C for an aesthetic nuisance effect; and D for an effect that cannot be measured. By-product coke plants, small jobbing foundries, and cement and lightweight aggregate plants are exempt and come under specific, less stringent rules. The program is implemented by local and state field representatives under the guidance of the central office of the State Department of Environmental Conservation. Field representatives include county and city health or environmental control agencies and district and regional offices of the state departments of health and environmental conservation. (Author abstract modified)

16331 APTIC NO. 33568

Myatt, D. O.

PROSPECTS FOR A NATIONAL INFORMATION SYSTEM FOR HAZARDOUS MATERIALS. *National Academy of Sciences National Research Council, Washington, D. C., Committee on Hazardous Materials, Proc. Conf. Hazardous Cargos, New London, Conn., 1969, p. 222-238. (July 8-9.) 5 refs.*

NTIS: PB 195685

National information system for hazardous materials is viewed as part of a national information center for the protection of life, property, and environment. The environmental protection field is generating a large flow of new information. A national information system must, therefore, be able to keep pace with rapid change, particularly in technology and management practices. The National Oil and Hazardous Materials Contingency Plan and the Environmental Protection Agency are discussed. Both of these should introduce long-run discipling forces that will speed the advance of the pollution control field toward technological maturity, stabilize the structures of the information systems that supoort it, and favor the appearance of a national system. The role of the Coast Guard in the control of oil pollution and hazardous cargos is discussed. The importance of the Federal Water Quality Administration, the Air Pollution Control Administration, the Poison Control Centers, and the National Agricultural Chemicals Association in a national system is stressed. It is believed that there are no overwhelming technical impediments to the development of a national information system or network for hazardous materials. The problem is a sociological one, since most people do not develop a sense of dedication on a subject such as safety.

16332 APTIC NO. 33637

Olds, F. C.

PREPARING THE ENVIRONMENTAL STATEMENT. *Power Eng., vol. 75:46-47, June 1971.*

An outline to assist power plants in preparing environmental reports is presented. The report must include such data as the plant description, power needs, and environmental impact summary. The effects of the plant construction and operation on the aquatic and terrestrial environmental must include surveys of the environmental, e.g., spils, vegetation, domestic animals and wildlife, and studies of rivers and lakes; possible effects of thermal discharges and emissions of solids, liquids, or gases; and meteorological studies, including data on seasonal and diurnal wind roses, stability classifications, and precipitation.

16333 APTIC NO. 33851

Soderberg, H. E.

DUST EMISSION LAWS AND TESTING PROCEDURES. *Preprint, American Mining Congress, Washington, D. C., 10p., 1970. (Presented at the American Mining Congress, Coal Show/Convention, Cleveland, Ohio, May 11-14, 1970.)*

Codes revealing different methods of determining the allowable amount of dust discharged to the atmosphere for the same application were reviewed for the coal industry. The five codes were a process weight code, potential emission rate versus allowable for a cyclone discharge of 5 gr/cfm, grains/SCFDG versus system volume, potential emission rate versus allowable for 10 gr/cfm, and total input MBTU/hr versus lbs Dust/MBTU discharged. For process weight, the larger the air volume, the higher degree if collection efficiency that is required due to allowable limits of particulates. There are variations of allowable particulates that can be discharged to atmosphere for the same process weight using different codes. On the larger systems, there are large allowable amounts of particulates when using the gr/cfm basis as compared to process weight. Correct sampling of discharge stacks was also reviewed. Stack sampling should be done at a point where the air flow is fairly smooth. After the point of sampling is established the velocity profile across the duct must be determined. The location of these sampling positions is a function of the duct diameter and each test is taken at a midpoint of equal duct areas which may be either rectangular or cylindrical. It is generally recommended that all stack sampling be done isokinetically which is where the velocity enters the sampling tip at the same velocity as the air flow past the sampling tip. Sample calculations were given.

16334 APTIC NO. 33788

Sreeramulu, T.

ENVIRONMENTAL DEGRADATION AND POLLUTION--NEED FD FOR THE ESTABLISHMENT OF AN AIR POLLUTION MONITORING PROGRAMME IN INDIA. *Sci. Cult., 37(2):80-82, Feb. 1971. 4 refs. (Presented at the University Grants Commission and Smithsonian Institution, Symposium on Ecology, New Delhi, India, Feb. 24-27, 1971.)*

Air pollution problems in India are considered. The importance of collecting comparable data for establishing the present levels of pollution is indicated, as well as the immediate need for initiating long-range base-line ecological studies to assess pollution effects. Methods for the collection of data for assessing pollution effects are described. Variations in the atmospheric parameters are mentioned, and indicator-plants are cited. With a well-planned national measurement program, formation of suitable legislation for effective air pollution control would be easy. (Author abstract modified)

16335 APTIC NO. [illegible]786

Stephenson, R. J.

THE FIGHT AGAINST AIR POLLUTION IN GREAT BRITAIN. *(La lotta control l inquinamento atmosferico in Gran Bretagna). Text in Italian. Ingegnere (Milan), 45(4):346-349, April, 1971.*

The administrative, social, and technical aspects of the air pollution fight in Great Britain are reviewed. The public awareness in the city of London after the smog alerts from the early 1950s contributed to the fact that this metropolis could be referred to as the smoke-free city in 1955. The Clean Air Act approved in 1956 allowed the creation of sections of smoke emission control throughout the country. This act was extended in 1968 when sale of bituminous combustibles became prohibited and the height of smoke emission from chimneys came under contol. None of the two laws, however, provided action against sulfur dioxide, except that the increased hight of the funnels decreased its noxious effects. Monitoring of air pollution is being performed in more than 1200 locations in Great Britain; the information is then coordinated by the Warren Spring Laboratory and the data on smoke and sulfur dioxide is summarized and published monthly. As opposed to the Clean Air Acts, the activity dictated by the Alkali Acts is carried out by inspectors which are designed by the Construction Ministry. Three main groups of industrial plants, the chemical, metallurgical and fuel industries are under direct control of the Alkali Act. The contribution of automotive traffic exhausts to air pollution through sulfur dioxide, carbon monoxide, hydrocarbons and nitrogen oxides is negligible. Their control is provided by standards in terms of admitted smoke limits imposed upon the automotive exhaust. Attempts in the design of new engines for automotive vehicles are in course.

16336 APTIC NO. 34057

Stern, Arthur C.

THE SYSTEMS APPPROACH TO AIR POLLUTION CONTROL (PART 1). *Clean Air, 4(2):27-33, July 1970. (Presented at the Clean Air Conference, Sydney, Australia, May 1969.)*

The classical systems approach to a problem is to first structure the real situation into a model; then give the model a graphic or mathematical form; effect a graphical or mathematical solution that optimizes the values used as measures of success; test the validity of the solution; and, finally, apply the solution to the problem. Block diagrams and linear programming are the common tools of the systems analyst. One form of excercising a model is what is called gaming, which is characterized by there being opposing forces, each attempting to maximize their position, when, in the context of the air pollution situation, polluters and receptors are in conflict. The basic model of the air pollution system has increasingly been structured in more and more complex graphic form, but has only recently been subjected to the introduction of appropriate mathematical algorithms and attempts at their solution. The most comprehensive air pollution system that can be analyzed is the global system which looks at all global sources and sinks, and, in the course of so doing, develops a global balance for each pollutant to determine whether sources and sinks are or are not in balance. Continental and national systems are discussed, as well as state-wide and regional systems. Strategic and tactical systems are defined, and transport and diffusion sub-systems are mentioned. Grid models, advanced meteorological models, and statistical models are described.

16337 APTIC NO. 34288

Stern, Arthur C.

THE SYSTEMS APPROACH TO AIR POLLUTION CONTROL (PART 2). *Clean Air (J. Clean Air Soc. Australia New Zealand), 4(3):47-53, Sept. 1970. 27 refs. (Presented at the Clean Air Conference, Sydney, Australia, May 1969.)*

In statistical air pollution models, air quality data enter as inputs and represent a feedback element in any model which compares air quality with an air quality goal or standard and then makes adjustments to the system to bring them into balance. Systems approach in air pollution work denotes almost any systematized procedure for data acquisition, transmission, storage, retrieval, and display; the usefulness of these systems as operated by various jurisdictions in the U. S. is evaluated. Models being developed for economic sub-systems, and systems analysis studies of entire industries and individual plants within an industry to gain data on sources and emissions, are described. Tactical models should tell an air pollution control agency what needs to be done immediately to avert an air pollution episode (by continuously telemetering emission data from principal readily controllable sources to the central computer operating the model, with direct feedback to the sources); a strategic model should develop a long-range plan of air pollution control, which usually involves establishment of emissions standards for various source categories.

16338 APTIC NO. 34195

Suzuki, Takeo

GENERAL THEORY ON ENVIRONMENTAL DISTURBANCES. *(Kogai soron). Text in Japanese. Naika, 21(5):804-809, May 1968. 18 refs.*

An analysis of what constitutes public nuisance is presented to avoid random misuse of the term and to develop more constructive techniques of environmental welfare preservation. Present Japanese uses of the term include the general disturbances affecting environmental hygiene, e.g., air and water pollution, noise, vibration, ground settling, and deprivation of the sunlight, with respect to the social problems they create; sources of the disturbances, e.g., industrial, city, architectural, and traffic; the legal concept of the term as opposed to private nuisance; the official definition according to Basic Public Nuisance Act 132 issued on August 3, 1967, which determines the broad spectrum of air and water pollution, noise, vibration, ground settling (except for mining), and offensive odor, whether caused by industrial operations or other sources, to the extent that human health or environment are damaged. Pitfalls of Japanese anti-pollution measures lie in their after-the-fact treatment and neglect to research and develop preventive measures from the standpoint of natural sciences. The causes of public nuisance are complex, but combined epidemiologic and clinical studies would result in more effective preventive policies.

16339 APTIC NO. 33756

Talsky, Leo C.

DOLLARS IN THE AIR: AN APPROACH TO POLLUTION ABATEMENT THROUGH EFFLUENT TAXES. *J. Environ. Sci., 14(5):23-20, Sept./Oct. 1971. 12 refs.*

The traditional fiscal approach to pollution control has been reliance on tax incentives to encourage installation of abatement devices. The fallacy of this approach is that firms have little incentive to purchase devices that neither add to revenues nor reduce costs. A more efficient control scheme would be a tax on amount of pollutants discharged. Advantages of an effluent charge are its ability to produce revenues, its shift of responsibility for deciding optimal emission levels to the emitter himself, its reward for clean-up efforts; its explicit recognition that the level of optimal emissions is closely tied to the technical ability to control, and its provision of a continuing spur to control innovation. The first step in the development of the effluent tax could be the computer simulation of average specific characteristics, by zones, of a particular airshed. Once these characteristics are defined, a politically feasible ambient air quality standard can also be set by zones and a tax levy established to pay for use of this air. Assessment of pollution emission need not be more difficult than the personal property tax and could be applied in combination with it.

16340 APTIC NO. 34013

Verleger, Philip K.

THE ENGINEER VS. THE EPIDEMIOLOGIST: THE PLACE OF AIR QUALITY STANDARDS IN THE REGULATION OF AIR POLLUTION. *Environ. Affairs, 1(2):360-366, June 1971. 19 refs.*

From the beginning, both in its regulations and in the exercise of the permit power, the Los Angeles District has aimed, basically, at getting the maximum of control available, within the limits of available engineering skills, for any operation carried on within the District. It did not attempt first to determine what the level of emission was that caused the problem, and then to adopt regulations directed at bringing emissions down to a level below that. Nonetheless, it embarked on a vigorous program of regulation, adopting rules restricting emission of combustion contaminants, regulating the sulfur content of fuels burned, and, with the development of the theory of photochemical smog, restricting the escape of vapors from refining and distribution of gasoline and the use of solvents. With the discovery of that theory regulatory emphasis in California gradually passed from the County to the State level, and at that point, the concept of standards was first developed. Paralleling this work at the regulatory level, pathologists, toxicologists, and other medical researchers were more or less continually attempting to find ways of detecting effects of various gases at lower and lower levels. It will be necessary to depart from the idea of using any effect as criterion and that some appraisal of the significance of the effect will be needed.

16341 APTIC NO. 33474

Wilson, Edward F. and William Reilly

ENFORCEMENT PROCEDURES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 16p., 1971. 3 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 64th, Atlantic City, N. J., June 27-July 2, 1971, Paper 71-6.)*

In the Fall of 1969, Philadelphia adopted an Air Management Code, a broad-based enabling act with an expanded set of definitions giving broad administrative and enforcement powers to the Department of Health, Licenses and Inspections, and Law and extensive regulatory authority to the Air Pollution Control Board. The philosophy of the enforcement procedure is to obtain compliance with the standards of the Air Management Code and Regulations through the development and implementation of improvement programs. If this approach is not successful, the full line of enforcement actions can be brought to bear, including municipal court action and fines, orders, license revocation, sealing of equipment, and common pleas court action in the form of an injunction or restraining order. Air Management Services initiates enforcement actions only when it is determined that other types of administrative remedies will not accomplish the job. In all cases where it is appropriate, industrial and commercial companies with responsive management are given ample opportunity to develop improvement programs. Because of the flexibility provided by the Air Management Code and the fact that the Enforcement Procedures are designed to maintain and utilize this flexibility, Air Management Services has the capability to choose the course of action which will give the maximum result with minimum dislocation and resource requirement. (Author abstract modified)

16342 APTIC NO. 33846

Wolff, L.

THE PUBLIC HEALTH SERVICE WITH RESPECT TO ENVIRONMENTAL PROTECTION. *(Die Situation des oeffentlichen Gesundheitsdienstes im Hinblick auf den Umweltschutz). Text in German. Oeffentl. Gesundheitswesen (Stuttgart), 33(10):651-658, Oct. 1971.*

Actions taken to date against environmental pollution have generally ignored the public health service. For example, air pollutants are present in residential areas at such high concentrations that the climate is changed by haze and fog formation. The pollutants affect human health by attacking the respiratory tract. They can cause bronchitis, emphysema or even cancer. The dusts, gases, haze, and fog reduce the solar and ultraviolet radiation reaching the earth. As a consequence, retarded bone growth in children has been observed. Environmental pollution and human health are closely connected. The advice and help of the public health service, therefore, should be sought.

16343 APTIC NO. 33686

Zentzytzki, St. M.

ENVIRONMENTAL PROBLEMS DEMAND SOLUTION. *(Umweltprobleme verlangen Loesung). Text in German. Energie (Munich), 23(9):255-256, Sept. 1971.*

Tuebingen will receive a faculty for environmental research as one of the first universities in the Federal Republic of Germany. The tin plate industry announced the creation of a joint Committee on Environment. The Organization of German Chemical Industry revealed that they spent approximately $.925 billion for the protection of the environment over the period 1960 to 1969. The Association of German Engineers created a commission which deals with the maintenance of clean air. The development of processes which reduce the quantity of waste air and waste material is promoted. Young job seekers ignore positions offered by plants as air polluters or polluters of the environment. The site selection for a new plant with the sole emphasis on economy is no longer acceptable today.

16344 APTIC NO. 34184

Zimmerman, Joseph F.

THE ROLE OF THE STATE LEGISLATURE IN AIR POLLUTION ABATEMENT. *Preprint, Colby Coll., Waterville, Maine, 34p., 1970. 70 refs. (Presented at the New England Legislative Conference on Air Pollution, Waterville, Maine, Dec. 14, 1970.)*

Abatement programs, obstacles to effective implementation; and the federal role in air pollution abatement are considered, including interstate and federal-state agreements. Although the federal government has not preempted air pollution abatement except for automotive emissions, the Air Quality Act of 1967 and the National Air Quality Standards Act of 1970 are strong moves in the direction of total federal preemption and represent what may well be a last chance for state and local governments to adopt ambient air quality standards and a mechanism for their effective implementation. The organizational framework provided by the state legislature for control of air pollution can have a major impact upon the environment of the state; action taken by a state or local agency to enhance one aspect of environmental quality may have adverse consequences for other aspects. For example, the closing of incinerators polluting the atmosphere may create a serious problem of rubbish disposal and lead to the dumping of rubbish in wetlands. Legislatures may wish to reexamine the assignment of responsibilities for protection of the environment to several state agencies and the desirability of creating a multi-functional state environmental control department. State and local tax incentives for pollution control are discussed, as well as funding and staffing. (Author conclusions modified)

SOCIAL ASPECTS

16345 APTIC NO. 33555

Linnell, Robert H.

A MULTIDISCIPLINARY UNDERGRADUATE AIR POLLUTION COURSE FOR NON-SCIENCE MAJORS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 11p., 1971. (Presented at the Air Pollution Control Association Annual Meeting, 64th, Atlantic City, N. J., June 27-July 2, 1971, Paper 71-169.)*

The course in air pollution for non-science majors considers air pollution as a complex scientific-technical-social problem and endeavors to help the student better understand the many interrelationships. The course was organized into 15 two-hour lectures, 15 one-hour discussions, and several laboratory sessions which were visits to air pollution control laboratories and industrial complexes. Course materials covered science, engineering, biology, medicine, business and economics, political science, law, psychology and sociology, religion, and philosophy. Textbook material was a problem. Major sources included the National Air Pollution Control Administration and the Air Pollution Control Association. Other sources were listed. Each student was required to select a news story on environmental pollution and make a thorough analysis identify the issues involved, study the objectivity, and state the story s impact on them both before and after analysis. A term project was also required. These included slidetape educational programs on some phase of pollution, a wide variety of term papers, covering topics such as living ecologically, an alternative to the internal combustion engine, pollution plays, profits and pollution, and teaching pollution to elementary students. Student response was generally favorable. The main problems were the complex nature of the problems, the instructors inability to provide simple answers, and the wide and diverse sources of library materials. (Author abstract modified)

16346 APTIC NO. 33904

Perrine, R. L.

OIL AND ECOLOGY -- THE NEED FOR A NEW OUTLOOK. *Preprint, American Inst. of Mining, Metallurgical, and Petroleum Engineers, Inc., Dallas, Tex., Society of Petroleum Engineers, 12p., 1970. 39 refs. (Presented at the American Institute of Mining, Metallurgical, and Petroleum Engineers, Society of Petroleum Engineers, Annual Fall Meeting 45th, Houston, Tex., Oct. 4-7, 1970, Paper SPE 2952.)*

The nature of the air pollution problem as it pertains to the petroleum industry is considered, and a new educational framework which may make the solution of future problems easier is described. Photochemical air pollution in Los Angeles and the effect of automobile emissions are cited. Automotive emission reduction, the removal of lead from gasoline, and cost estimates for lead removal are considered. The need for a new breed of problem-solver is seen. A Doctor of Environmental Science and Engineering is suggested, which would combine physical, earth, and biological sciences with engineering. There must be an extensive internship program, with work under guidance on important problems in the real, industrial world.

GENERAL

16347 APTIC NO. 34142

AIR POLLUTION. *J. Indian Med. Prof. (Bombay), 16(12):7457-7458, March 1970. 1 ref.*

The worldwide spread of air pollution is a growing hazard. Restrictions are necessary to protect the natural environment from exploitation. Clinical observations indicate that much of the effect of pollution stems from the increase it causes in airway resistance. Although cigarette smoking is the principal cause of lung cancer, an estimated 100,000 Americans will die prematurely from emphysema, chronic bronchitis, and lung cancer related to environmental pollution. In Bombay, a fertilizer factory is contaminating the air but no official action has been taken. There is a permanent haze of smoke and steam, and harmful toxic substances such as benzol, chlorinated hydrocarbons, and manganese are persistent pollutants. It is incumbent upon the industries to take the necessary action for the control and disposal of effluents.

16348 APTIC NO. 33458

Engel, A. J.

WHAT IS AIR POLLUTION? In: Pennsylvania State Univ., University Park, Center for Air Environment Studies, Publ. 160-70, p. 6-10, 1970.

Not all materials that pollute the air are caused by man, but atmospheric pollution as a subject of concern for the general public has come into existence only as the result of technology. Starting with the use of fire, the atmosphere of all towns, even in early civilization, must have contained a considerable quantity of pollutants. Small particles invisible to the human eye contribute heavily to haze, dirt, and respiratory disease while other solid particles or liquid droplets are small enough to stay suspended in air for long periods and to be carried great distances by prevailing winds. Electric power production, industrial operations, transportation systems, and home heating are major sources which also produce gaseous pollutants, classified roughly into toxic gases (e.g., sulfur dioxide and carbon monoxide), photochemical smog, and noxious odors. Because of the high cost of control, a short range solution must be carefully ordered according to some set of priorities, with possible choices made between control of truly hazardous substances and those which are offensive or aesthetically annoying. Industry is inherently dirty, and if the public wants the fruits of industrial technology a price must be paid. An effective public lobby must act with a solid backing of facts and data rather than depend on emotionalism.

16349 APTIC NO. 33528

Horn, Karlwilhelm and Armin Knauer

PURIFICATION OF THE AIR AS A PROBLEM OF THE SCIENTIFIC-TECHNICAL REVOLUTION. *(Luftreinhaltung - Problem der wissenschaftlich- technischen Revolution). Text in German. Wiss. Z. Humboldt Univ. Berlin Math. Naturw. Reihe, 19(5):503-505, 1970.*

A general approach to the development of a system of planned measures for air pollution control based on social and economic conditions prevailing in a socialistic country is outlined. The solution of the problem must be based on the index figures of economic growth on one hand, and on the limitation of the negative environmental effects on the other. Since there is an interdependence between production processes and emissions, and between emissions and effects of emissions, planning should include establishment of parameters concerning these factors to attain maximum avoidance of injurious effects, rather than simply development of methods to counteract pollutants. A future solution of the problem will be possible if the specific injurious effect, i.e., the injurious effect per unit volume of production, can be reduced much faster than the rate at which the volume of production increases. The main criterion of effectiveness then is the total of the negative environmental effects that have been eliminated or obviated.

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